Surgery

Handwritten Note

Name: _________________________________________

Subject: _________________________________________

MBBS Help

http://mbbshelp.com

http://www.youtube.com/mbbshelp

http://www.facebook.com/mbbshelp.com
UROLOGY

KIDNEY

ANATOMY

Retroperitoneal Organ

Kidney to lower w.r.t. Kidney

Kidney is slightly midline

Flexed @ angle of 30° anteriorly

DROMEDARY'S HUMP - persistent fetal lobulations

Physiological, hence no Rx required.

More common L Side > R Side

T

| 5-7 cm |

Sim. midpoint

T₁₀ → L₂ L₃

⅓ Diaphragm

Lat ⅓ Medial ⅔ → Psoas

Quadratus lumbrorum / Transverse abdomen
Capsule

Inner → True Perinephric Fat
Outer → Pseudo capsule

Gerota's Fascia → anterior → Fascia Of Tolli
Posterior → Zucker Kandl's Fascia

Renal Sinus:
- Site of fusion of collecting system & vascular system.
- Imp. Landmark for Sx
- Renal Sinus coalesce to form Renal Hilum.
- Involvement of Renal Sinus in RCC = T3 Stage

Renal Artery:
- Arise from Aorta (L1-L2)
- R. Artery → Segmental artery
  
  Post  → Apical SA
  Ant. → Upper SA
  (Most consistent)  ↓  Middle
  Lower
Avascular = Brodel's Zone

(associated = least blood loss)

Anatrophic Sx = Sx done via Brodel's Zone or Boyce Procedure

② Renal Vein < ① Renal Vein [Length]

2-4 cm 8-10 cm

* Nutcracker Phenomena

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

Renal Collar - Bifurcation of ② Renal vein around aorta. may cause constriction of aorta
UROLITHIASIS

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

\[ \text{CONC' PRODUCT - } \text{CONC'} \text{ of solute in solution} \]

SOLUBILITY PRODUCT - Threshold saturation \( \text{CONC'} \).

\[ \text{CP} \gg \text{SP} \Rightarrow \text{STONE FORMATION} \]

\[ \text{Inhibitors} \]

FORMATION PRODUCT - \( \text{CONC'} \) at which effect of inhibitors is neutralised.

\[ \text{CP} \gg \text{FP} \Rightarrow \text{STONE FORMATION} \]
**EQUIL-2** → **Stone Probability Calculation score**

**INHIBITORS FOR STONE FORMATION**

1. Citrate (Most Potent)
2. Magnesium
3. Polyanions (mucopolysaccharides, glycosaminoglycan)
4. TAMM HOREFLA PROTEIN
5. Nephrocalcin
6. Uropeptin
7. Osteopontin

**Misc.**

Ø > Ø
White > Black
Geo: - extreme → cold
Hot /acid.

RARE in children.

**RISK FACTORS**

1. Dehydration
2. Infection
3. Hypercalciuria
4. Low citrate
5. Vit A Deficiency
6. Gout / Pseudo gout
7. Renal Tubular Acidosis
8. Cystinuria
**Types**

17 Calcium Oxalate (75-80%) / Mullberry / Jack. Stone.

Radio-opaque

Reddish Brown (? Hematuria) (? Hemosiderin) due to hard appearance

Spinculated

Monohydrate DIhydrate

Dumbbell shaped Envelope shaped

Resistant ESWL Sensitive

Mullberry Stones

**Hypercalciuria:**

> 77 mmol/day in 5

> 75 mmol/day in 1

on Calcium in urine

> 200 mg/day = Urine Ca²⁺
2) **PHOSPHATE STONES** (10-15%)

- **RADIO-OPAQUE**
- **WHITE**
- **Shape**: COFFIN LID / RECTANGULAR
- **a/ε INFECTION** [Phosphate stones are H/L Type]
- **COMP**: Ca. Phosphate
- **Ca ε ALKALINE URINE**
  
  ↓

  **a/ε UREASE SPLITTING ORGANISM**
  
  (Protease \(\rightarrow\) H/L Infe)
  
  **not E. Coli**

**Variants of Phosphate**

1) **TRIPLE PHOSPHATE**
   
   Ca Amm. Mag. Phosphate

2) **STRUVITE** = Amm. Mag. Phosphate +
   
   Ca. oxalate Hydroxyapatite

**INFECTION STONES = STRUVITE**

**STAGHORN CALCULUS** = STRUVITE Occupying Pelvic calyceal system Types

**COMPLETE**

Occupancy of \(>80\%\) of pelvic calyceal system

**INCOMPLETE**

Occupancy of at least 2 pelviccalyceal system
37 URIC ACID STONES

Radio-lucent

Orange colour

Shape: AMORPHOUS SHARDS (plate like)

\( \frac{a}{c} \) ACIDIC URINE.

(\( \text{pH} < 5.0 \))

\( \frac{a}{c} \) GOUT/ Pseudo gout.

\( \frac{a}{c} \) URICOSURIA

where uric acid > 600 mg/day

47) CYSTEINE STONES

HARDEST

Radio - OPAQUE

Blue - Green ( ? sulphydryl group @ Tail)

Hexagonal

\( \frac{a}{c} \) HOMOCYSTINURIA.

\[ \text{Cysteine} \rightarrow \text{Arginine} \]

\[ \text{Cystinuria} > 200-250 \, \text{mg/day where cysteine} \]
5. **Brushite Stones**
   - Radio-opaque
   - Yellowish
   - Prismatic/needle-like
   - Calcium phosphate hydroxyapatite

6. **Xanthine**
   - Xanthine Metabolism Defect
     - Radio-lucent
     - Brick-red

7. **Ammonium Urate**
   - Radio-lucent
   - Laxative Abuse (↑ Na⁺ loss; metabolic acidosis)
   - IBS
   - Acidosis - ↓ Na⁺

8. **Matrix Stone**
   - Inorganic component
   - Protein Rich stone 65%
   - Organic sugars
   - Polyanions
   - Brown colour
   - Spongy stone & cystic spaces
   - ESWL Resistant
ESUR RESISTANT STONES

Cal. ox. Monohydrate
Brushite
Manna stone

TOC - RENOSCOPE REMOVAL

DRUG RELATED-
1) Indinavir
2) Trazole
3) Yacemterene
4) Ephetrine
5) Silicates

COMMERCIAL NAMES

1) Ca Oxalate Monohydrate = WHEWETITE
2) Ca Oxalate Dehydrate = WHEDELITE
3) Triple Calcium Phosphate = WHITLOKITE
FEATURES

1. Pain @ Flanks.
   @ Renal Angle Tenderness
   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.

Mx

CONSERVATIVE

INDICATION:
17. Size < 5-6cm
27. 8
   + Hydration to maintain urine output 2L
   Cons.
   Antibiotics
   NSAIDS

INTERVENTION

→ ESWL
→ PLNL
→ Renoscopic Removal ("lithotripsy")
→ Lap. Surgical Stone Removal
Dissolution Therapy

- Cystine
- Uric Acid Stones

Principle :
1. Hydration
2. Alkalisation of urine
3. Uric acid → allopurinol
4. Cystine → d-Penicillamine
   or
   Propionyl-glycine

Precautions :
1. Water → Hard is protective
2. Beverage :
   Carbonated Beverages → protective except [Phosphate Rich Carb.]
3. Citrate Juice ↓↑ uric.
4. Protein Restriction diet ↑↑
5. Na↑ Restriction
6. Adequate Ca²⁺ Intake :
   ↑↑ Ca²⁺ → ↑↑ Abs → ↑↑ stone
   ↓↓ Ca²⁺ → ↑↑ ox. absorption,
   ↑↑ stones
So, adequate Ca²⁺ intake
Hegd.
6) ↑ BMI → ↑ stone
7) Orthophosphate → ↓ stone
8) Rice Bean → ↑ stone

INTERVENTION

Stone → Location
    ↓ Size
    ↑ No. Composition

LOCATION

Non-Lower Pole

Lower Pole Location

Non-Lower Pole

Size

< 1 cm

ESWL

PCNL

S-S < 10 cm

SS > 10 cm

< 1000 HF

> 1000 HF

Cystine ST.
Cal. Oxalate
Brushite, Match

ESWL

Stone → Stone

Rendoscopic Removal
< 1 cm → ESWL

> 2 cm → PCNL

1-2 cm → 1st Line ESWL → Renoscopy → Removal

LOWER POLE STONES

< 1 cm

S-S < 10 cm

< 1000 HF

↓

ESWL

≥ 1000 HF

ESWL

Resistant

↓

Renoscopic Removal

1-2 cm

1 cm

≥ 10 cm

PCNL

Contradicted

PCNL

> 2 cm

ESWL

≥ 1 cm → ESWL

1-2 cm

≥ 1 cm → 1st ESWL → Renoscopy (Repeat)

> 2 cm → PCNL

* STONES IN = conservative - Hydration

NSAIDS

Antibiotics

In case of obstruction → DJ stenting (double J)
* Stones In Horse-Shoe Kidney
  PCNL → Roc

* Stone In Calyceal Diverticula
  PCNL → Roc

* Pediatric Stones-
  <1 cm → TOC + ESWL
  >1 cm → PCNL

ESWL
Extra-corporeal shock wave Lithotripsy.

TECH 8-

ESWL
  → IMAGING UNIT
  ↓ USG
  ↓ Fluoroscopy

GENERATOR
  ↓ Shock Wave

1st gen
  - Electrohydraulic Generator
    ↓ Used SPARK Plugs
      ↓ Spherical Shock Waves

2nd gen
  - Electromagnetic Generator
    ↓ Use - Acoustic Lens
      ↓ Cylindrical shock waves

3rd gen
  - Piezoelectric Generator
    ↓ Plane shock waves → exact, precise
Stone

Spall # - 1st Dent in the Stone

C/I to ESWL

1. Thrombocytopenia
2. 
3. Coagulopathy
4. CRF
5. Diabetic Nephropathy
6. Elderly
7. Cardiac Disease
8. Larger Stones

Complication

1. Hematuria - HCC
2. Hematoma
3. Organ Injury
4. Chronic Sclerosing Fibrosis
5. Steinstrasse - Street of Stone

Urteroscopic Removal

Blockage of the urinary tract by fragments of stones.
PCNL
- Percutaneous Nephrolithotomy
Access to kidney via Inf. Calyx
(Except Via Sup. Pole + RT of Pleural injury)

Exception: Horse-shoe kidney
Access - Sup. Pole

Complication:
1) Hematoma
2) Hematuria
3) Colonic Perforation

Ureteric Stone
Sites of Impaction

PUJ
Crossing of Ilioac vessel
Relation to ductus deferens / Round lig.

UVJ
Gonadal vessels
Ureter
Ilioac vessel
FEATURES -
1) Pain → Loin along Genitofemoral Nerves
   → Gerota's T10 - L2
2) Hematuria
3) Obstruction
4) Urosepsis

Mx -
1) Conservative Mx is preferred
   * Medical Expulsion Therapy (MET)
   1) α-blockers
   2) Steroid
      ↓
   Tamsulosin
   3) CCB (least preferred)
      ↓
   Deflazacort
   Nifedipine
   +
   Hydration
   Antibiotics
   NSAIDS

INDICATIONS FOR INTERVENTION
1) >5mm
2) Symptoms > 3-4 wks
3) Young age
4) Severe symptoms
5) Not responding to medication
6) Obstruction
1. Upper 1/3
   - Ureteroscopic Removal
   - Ureteroscopic Lithotripsy (USL)

2. Middle 1/3
   - ESWL
   - PCNL after pushing back

3. Lower 1/3
   - USL

4. USL
   - Sx = Lap/Robot assisted removal

5. Cystoscopy
   - Meatalotomy
   - For stones or meatal

6. Dormia Basket
   - Blind Procedure
   - For solitary - Lower 1/3 stone obsolete now.
**BLADDER STONES**

- **Age**
  - Infants
  - Elderly

- **B. Bladder**
  - B. Bladder, Buddehe

- **Risk**
  - a/c Low Phosphate Diet
  - Infection
  - Schistosomiasis

- **Drainage**
  - Foley's Catheter
  - Foreign Bodies
  - Puric acid

**TYPES**

1. **Sterile Urine**
   - Mixed Uric Acid
   - Mixed Urate
   - Radio-Opaque
   - R. Lucent
   - Jack Stone / Mulberry

2. **Infection**
   - M/c - Phosphate Stones

**Features**

1. Pain @ top of genitalia
2. ↑↑ Ambulation
3. ↑↑ Recumbency
2) Terminal Hematuria

\[ \text{Mx-} \]
\[ \text{CYSTOSCOPIC REMOVAL} \]
\[ \text{Lithotripters} \]

\[ \text{PROSTATIC CALCULUS} \]

\[ \text{ENDOGENOUS P.C.} \]
\[ \text{calcified corpora amylacea} \]
\[ \text{Do not need Rx} \]
\[ \text{If symptomatic} \rightarrow \text{TURP} \]

\[ \text{EXOGENOUS P.C.} \]
\[ \text{CALCULUS IN PROSTATIC URETHRA} \]

\[ \text{URETHRAL CALCULUS} \]

- Exclusive to \( \beta \)
- Pain at tip of genitalia \( 
\text{I reduced stream of urine} \)
- Forking of urine

(\( \text{site for urethral calculus} \))
Rx - CYSTOSCOPIC REMOVAL

Proximal impacted stones

(eg. Meatus → Meatotomy & Stone Removal fossa navicularis)

MALIGNANCY

RENAL

BENIGN

H/c Benign lesion = SIMPLE RENAL CYST

H/c Benign Tumour = ONCOCYTOMA

ONCOCYTOMA

Pseudocapsule

♂:♀ = 3:2

Tan Mahogany Colour

Central Stellate Scar

GENETICS - Loss of chromosome 1

Loss 14

Loss Y

ORIGIN - Intercalated cells
**ONCOCYTOMA**

Benign

- HALE colloidal
  - Iron Stain
- Parvalbumin
- Claudin

**RECL (CHROMOPHobe)**

Malignant

+++ +

**IOC:**
- CECT → Central Stellate Scar
- CT Angiography → Spoke Wheel Arrangement

**Rx:**
- Partial Nephrectomy (Nephron sparing sx)

**ANGIO MYOLIPOMA** (AML)

<10%

♀ >> ♂

↑ ↑ age

5th - 6th decade

Sporadic, >7 Familial

♂ 3rd decade

♀ Tuberosous Sclerosis

**ORIGIN:**
- Neural crest
  - PEC2 (Perivascular Epithelioid Cell)

It consist of tortuous aneurysmal blood vessel:

- M/s (smooth)
- Fat
CT → 1500 15 HF
H/M → −20 HF

+++ HMB-45 (Human Melanocyte Black)
marker for Malignant Melanoma

S-100
Tyrosinase
HMB-45
LDH
Melan-A

FEATURES:

1) Spontaneous Retroperitoneal Haemorrhage
    WUNDERLICH SYNDROME

M/C = Angiomyolipoma >> RCC

Flank Mass

LENK'S TRIAD

Hypovolemia  Flank Pain

RCC = Angio-EMBOLISATION
Mx of AML:

\[ <4 \text{cm} \]
- Asymptomatic → Observation
- Symptomatic → Wunderlich's
- Angio-embolization

\[ \geq 4 \text{cm} \]
- 1st Line → Angio Embolization
- ToC → Partial Nephrectomy

Renal Cyst

ToC → CECT

<table>
<thead>
<tr>
<th>Type</th>
<th>Bosnaik Classification</th>
<th>Risk of Malignancy</th>
<th>Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Clear, water cyst</td>
<td>0%</td>
<td>Observation</td>
</tr>
<tr>
<td>II</td>
<td>I + Fine Calcification + Fine Septation</td>
<td>&lt;10%</td>
<td>Observation</td>
</tr>
<tr>
<td>II F</td>
<td>II + Perceived enhancement</td>
<td></td>
<td>Closest Follow-up Ind&quot; for Renal Mass Biopsy</td>
</tr>
<tr>
<td>III</td>
<td>II + Well defined Calcification + Irregular Border + Thick Septation</td>
<td>60%</td>
<td>Sx</td>
</tr>
</tbody>
</table>
RCC

H/c Tumour of Kidney.

$0^\circ \gg 90^\circ$ (3:2)

65 yrs (Avg. age)

White $>\$ Black

Incidence $= 12 \text{ in } 100,000$

Radio-resistant tumour.

$\uparrow \uparrow$ Predisposition for vascular spread.

(Ive. extension $\to$ is seen in $10\%$)

UL $[B/L \text{ in } <2\%]$

$$\begin{bmatrix}
\text{TRICK - Rule 92.} \\
\text{any 2 organs 2 in no. in GU Tract} \\
\text{Risk of B/L Ca is } <2\%
\end{bmatrix}$$

Pathological stage $\to$ most imp. prognostic factor

Other progn. factors -

1. Histological (nuclear grade)

Fuhrman's grading
Tumour size

Vessel Wall Invasion

extension (<10\%)

Risk Factors

1) Tobacco
2) Obesity
3) HTN
   Other R/F -
   1) Radiation
   2) aromatic Hydrocarbons
3) Heavy metals
4) Yeast
5) Diet

It is a dye.
Angiosarcoma (Most common Ca)
Cholangio Ca
Rcc
Hepato cellular Ca

Features

1) Related to kidney

1) Flank mass
2) Flank Pain
3) Hematuria

Internist Tumour
Grawitz Tumour
Hypernephroma
Peripheral Hematoma

Related to effect of Rec.

1. ↑ B/L edema of lower extremity
2. Vasocecle → due to block of IVC. 
   B/L or Rt > Lt

[vasocele usually
is (L) > (R) but
that due to Rec
R > L]

2: Incompetent valve of
gonadal veins

Paraneoplastic Syndromes -

1. ↑ ESR
2. 2nd Anaemia
3. Hypercalcemia
4. HTN
5) Polycythemia

6) Stauffer Syndrome - non-metastatic Hepatic failure due to RCC.

7) Other.

8) Hyperglycemia

**Familial RCC**

![VHL gene - VHL gene \n chromosome - 3 \n VHL gene code for \n \n HIF (Hypoxia Induc' \n Mutations \n \n ↑HIF1 \n \n ↑EGFR \n \n ↑VEGF \n \n Neovascularization \n Tumours \n Tumours A/E VHL \n 1) Brain → cerebrall Haemangioblastoma \n 2) Eye → Retinal Angiomas \n 3) Renal → Clear cell RCC \n Renal cyst \n 3) Adrenal → Pheochromocytoma
4) PANCREAS → Islet cell Tumour
    Pancreatic cyst

5) EAR → Endolymphatic Sac Tumour

6) Epididymis → Cystadenoma

IV) HEREDITARY PAPILLARY RCC

   a/2 C-MET Proto-oncogene Mut
   
   a/2 Type I Papillary RCC

III) HER. LEIOMYOMATOSIS PAPILLARY RCC

   - Fumarate Hydratase mutation.
     1st → chromosome 1

   - a/2 uterine/ cut Liomyomas.
   - Type II Papillary RCC

IV) BSRT HOGG DUBE SYNDROME

   - a/2 17q mut

   - a/2 Chromophobe RCC → Oncocytoma

   - a/2 Spontaneous Pneumothorax
     Pulmonary cyst
     Cutaneous Fibrofolliculomas
**MAINZ CLASSIFICATION**

(PATHOLOGICAL)

1. CLEAR CELL RCC (75-70%)
   - Origin: PCT
   - Genetics:
     - Loss of $3p$, $8p$, $9p$
     - Gain of $5q$
   - Features:
     - Yellow
     - Well circumscribed
     - Lobulated
     - Highly vascular Tumour
     - Tendency of venous extension
     - Respond to Immuno therapy

Tumour Markers:
1. Cytokeratin
2. $CA-^{II} A_9$ → Carbonic anhydrase II
3. $EPC$ → Epithelial Presenting Carcinogen

Pros: Poor.
II. PAPILLARY RCC (10-15%)

Origin → Pct

Genetic → a/2 trisomy of 7, 17, Y

Features → hypovascular
           Pseudocapsule
           Hz Fleshy Tumour
           a/2 CKD 00
           Polycystic Kidney 00

TYPE

\[ \begin{array}{cc}
I & II \\
\text{IT Basophils} & \text{IT Eosinophil}
\end{array} \]

Better Prognosis           Poor Prognosis

TUMOUR MARKERS -

1) Cytokeratin-7
2) LMW - CK-7
3) AMCAR (α-mercapto CoA Racemase)
   ↓
   also ↑ in Ca Prostate

Overall Good Prognosis
III. CHROMOPHOBIC RCC (<10%)

- AlДата "Mut" in 1) Fumarate Hydratase
  2) Multiple gene mut".

- Tan/Brown colour
- Well circumscribed
- Arise from intercalated cells

FEATURE:
1) Plant cells
2) Resin nucleus
3) Perinuclear clearing
4) H+ Cosinophiles

+++ Hale colloidal iron stain

Prog: Good except sarcomatoid variety

IV. COLLECTING DUCT

Origin: DCT

FEATURE: Grayish-white
  Central in location
  H+ Infiltration

Prog: Poor
MEDULLARY RCC

Sickle cell Trait
Lacy Pattern
Worst Prog.

Δsis: - Ioc \(\Rightarrow\) CECT
Ioc \(\Rightarrow\) RCC \& venous extension \(\Rightarrow\) MRI
Best \(\Rightarrow\) Veno cavaography
- done if MRI is -ve.
- Invasive nature

STAGING OF RCC

WHO	Older\(\Rightarrow\) Robson

\[ T_1 \leq 7\text{cm} \]
- \( T_{1a} \leq 4\text{cm} \Rightarrow\) PARTIAL NEPHRECTOMY
- \( T_{1b} > 4\text{cm} \leq 7\text{cm} \Rightarrow\) RADICAL

\[ T_2 > 7\text{cm} \]
- \( T_{2a} > 7 \leq 10\text{cm} \)
- \( T_{2b} \geq 10\text{cm} \Rightarrow\) LAP. NEPHRECTOMY

\[ T_3 \] Into Renal vein / IVC / Perinephric Fat

\[ T_4 \] I/L Adrenal
Gersot's Fascia

Mets \(\Rightarrow\) C/I. Adrenal
\[ \begin{align*}
N_1 &= + \ln N \\
N_0 &= N_0 \ln N
\end{align*} \]

**MANAGEMENT**

\[ \rightarrow Sx \]
\[ \rightarrow \text{ABLATION} \]
\[ \rightarrow \text{ACTIVE SURVEILLANCE} \]

**Partial Nephrectomy**

**INDICATION**

- T1a \( \leq 4\) cm
- Solitary kidney irrespective of size
- C/I Diseased
- Pre-existing CRF (Overloaded kidney)

**PARTS REMOVED**

- Preserve at least 20% functional kidney
- Organ minimum functional reserve
- Kidney 20%
- Liver 30% (25 - 30%)
- Spleen 50%

**Radical Nephrectomy**

T1b onwards

**Kidney**

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

**Adrenal**

- Routine removal is C/I
- Indication for removal
  - if adrenal involved
  - upper pole Tm.
PARTIAL

Hyperfiltration Syndrome
(11 urine protein loss)

(II) ABLATION

INDICATIONS 2-
1> Elderly not fit for sx
2> advanced Rec
3> Post-sx Recurrence
4> multifocal familial Rec

ABSOLUTE C/I:
Any Tm > 4cm size

3 TECHNOLOGY

1> CRYO

Cryoprobe
generate Ice Ball

CRYO

tip
3mm proximal tip.
Temp = -20°C
we use liquid N2 Helium
\[ 1st \text{ FREEZE} \quad \downarrow \quad \text{cycle} \\]
\[ \xrightarrow{\text{Then THAW}} \quad \downarrow \quad \text{To damage} \quad \text{microcirculation} \]
\[ \text{Necrosis} \quad \text{Ischaemia} \]

\[ \langle \text{III} \rangle \quad \text{ACTIVE SURVEILLANCE} \]

\textbf{Indications}

1. Elderly; not fit for surgery
2. Young patients with features of slow benign lesion
   - Bosnak \( \rightarrow 24/24/1 \) \( F/II/I \)
   - F/U 6 monthly
   - CECT/MRI
   - If lesion decides B/M lesion

\[ \frac{c/I}{1} = \]

1. \( > 4 \text{cm} \)
2. Young patients with solid/dense Tm
3. Radiological features \( \Rightarrow \) slow malignancy

\textbf{Locally Advanced RCC}

\textbf{TOC} = EN Bloc NEPHRECTOMY

Kidney
+ \( \text{f. Fascia} \)
+ \( \text{Adrenal} \)
+ \( \text{L.N.} \)
+ All local structures involved
RCC T VENOUS EXTENSION

10%

STAGE [T3]

RADICAL NEPHRECTOMY + THROMBECTOMY (RN)

RCC T VENOUS WALL EXTENSION

RN + VENO - VENOUS GRAFTING

Post Sx → chemotherapy

+/- Immunotherapy

1) sirolimus
   - temsirolimus
   - everolimus
   - mTOR inhibitors

2) Sorafenib / sunitinib
   - multi-kinase inhibitors

3) Bevacizumab

4) Cetuximab etc.

RT → RC → Radioresistant
Follow-up of RCC

Low Grade RCC

T1 N0 M0

- Baseline CT/MRI
  - 3rd Month
  - Annual CT/MRI x 3 yearly

High Grade RCC

T2→T4; N0; M0
any T; N1 M0

- Baseline CT/MRI
  - 3rd Month
  - 6 monthly CT/MRI x 3 yrs
  - Annual CT/MRI x next 5 yrs

SAME

CHEST X-RAY

SAME
BLADDER CARCINOMA

TYPES

1) UROTHELIAL CA (H1c Type) 90%

or

TRANSITIONAL CELL CARCINOMA

2) SCC (2-3%) 2nd H1c
   2nd H1c
   Schistosomiasis
   Stones

3) ADENOCARCINOMA (<2%)  
   Dome of bladder - M1c SITE
   Drainage procedure [al & ureterosigmoidoscopy]
   Discharge @ umbilicus [al & urachal CA]

RIF FOR BLADDER CA

1. Cigarette (component of tobacco ⇒ 4-aminobiphenyl)
2. Cyclophosphamide (Phenaustine also)
3. Chemical
   (Aromatic Hydrocarbon ⇒ Anniline)
4. Schistosomiasis
5. Stones
6. Radiation
7. F.B. [Catheter].
C/F

PAINLESS HEMATURIA

Umbilical D/C (sewou/ sanguenou)

- seen in URACHAL CA

Δ:

1.0 c for Hematuria > CT UROGRAPHY

GOLD STD ⇒ CYSTOSCOPY

TRANS URETHRAL RESECTION OF
BLADDER Tx (TURBT)

⇒ cystoscopic excision Biopsy

Adv: Tells About

TYPE

Stage

Grade

T1 = Into epithelium

G1 = Low

T2 = Into muscularis

G2 = Intermediate

T3 = Outside Bladder

G3 = High

T4 = Into local str.

Tis = CA In situ
**UROTHELIAL CA** [UC]

**MUSCLE NON-INVASIVE**

\[ T_{is} ; T_1 \]  
\[ \downarrow \]  
Check the grade

\[ C_{g1/2} \]  
\[ \downarrow \]  
Solitary  
\[ \downarrow \]  
SINGLE DOSE

\[ \downarrow \]  
Intravesical CT

**MUSCLE INVASIVE**

\[ T_2 \text{ and Above} \]  
\[ \downarrow \]  
SCC  
\[ \rightarrow \]  
RADICAL CYSTECTOMY

\[ \downarrow \]  
CT + RT

\[ \downarrow \]  
PARTIAL CYSTECTOMY  
may be done for DOME of Bladder Ca → En young pt.

\[ \downarrow \]  
Multiple

\[ \downarrow \]  
6 weeks  
\[ \downarrow \]  
Intravesical Immunotherapy (BCG)

\[ \downarrow \]  
3 monthly booster doses  
for 3 years
For Non-Invasive

3 MONTHLY FOLLOW UP (Cystoscopic)

Intravesical CT
- Mitomycin
- Gemcitabine
- Doxorubicin
- Thiotepa (not used now)

Intravesical Immunotherapy
Doc to BCG

started 2 week post TURBT

↓

so that wound get healed in 2 week

C/I for BCG

1. IDs
2. HIV
3. C in 10 days of TURBT
4. Traumatic catheterisation

S//E -

BCGosis ⇒ Rx ⇒ Protection

↓

6 monthly ATT

For Advanced Bl CA ⇒ Palliative CT + RT

↓

after that

DIVERSION OF URINE
DIVERSION OF URINE

URETEROSTOMY

\[ \downarrow \]

URETEROSIGMOIDOSTOMY

\[ \downarrow \]

ILEAL CONDUIT CONTINENT DIVER

Opening ureters directly into the skin.

- Ureters directly open into sigmoid colon.
- Hyperkalemia
- Hyperchloremic
- Metabolic acidosis
- \( \uparrow \) H+K of Adenoc. to colon (200 times)

ILEAL CONDUIT

\[ \Rightarrow \]

Most Popular

ILEOSTOMY
CONTINENT DIVERSION (Neo Bladder)

Koch’s Pouch (Ideal Pouch)

If ascending colon is used → INDIANA Pouch
CA PROSTATE

M/c SITE = Peripheral zone Post. Lobe
M/c TYPE = Adeno Ca (mixed type >> Small cell type)
BLACK >> White
M/c visceral malignancy in GVI In 0°
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)

RIF:
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:**

1. 5α Reductase inhibitors
2. Green Tea
3. Soy Protein
4. Vit E
5. Lycopene
6. Statins

**PIN → PROSTATIC INTRAEPITHELIAL LESION**

PIN ≠ CIS

Benign prostate acini surrounded by atypical cells

<table>
<thead>
<tr>
<th>GLEASON’S GRADES</th>
<th>SCORE (GS)</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 3, 4</td>
<td>GS</td>
<td>LOW</td>
</tr>
<tr>
<td>5, 6, 7</td>
<td>GS</td>
<td>INTERMEDIATE</td>
</tr>
<tr>
<td>8, 9, 10</td>
<td>GS</td>
<td>HIGH</td>
</tr>
</tbody>
</table>
**Steps in Calculation of GS**

1. Select in 2 most common pathologies.
2. Grade the selected pathologies on scale of 1 to 5.
   - Most Differentiated
   - Undifferentiated
3. Add the two scores to get final score out of 10.

**Example**

\[ \text{50\%}, \ C.\ G. = 4 \]
\[ \text{10\%}, \ C.\ G. = 5 \]
\[ \text{15\%}, \ C.\ G. = 2 \]

**Steps**
\[ A + C \]
\[ 50\% \times 20\% \]
\[ 4 \times 2 \]
\[ \Rightarrow \frac{6}{10} \]

**In case of single pathology**

\[ \text{30\%}, \ C.\ G. = 3 \]

**Steps**
\[ A + A \]
\[ 3 + 3 = \frac{6}{10} \]

In calculation of GS, any pathology < 5\% is not accounted.
\[ A + A \]
\[ \Rightarrow \text{GS} \Rightarrow 4 + 4 = \frac{8}{10} \]
PARTIN'S TABLE
JEWITT - WHITTMORE STAGING

STAGING OF CA PROSTATE

EARLY CA PROSTATE

\[ T_1 = \text{Non palpable; incidentally detected} \]
\[ T_2 = \text{Palpable; but confined to prostate} \]

ADVANCED CA PROSTATE

\[ T_3 = \text{Outside prostate} \]
\[ T_4 = \text{Into local structures} \]

Diagnoses

TRUS + Guided Biopsy

\[ \uparrow \text{Tm Marker} \]

SCREENING

M/c used method \( \Rightarrow \) Sh. PSA + DRE

Most effective \( \Rightarrow \) Sh. PSA + DRE + TRUS

(by WANTANBE 1st)

Ages started 50 yrs onwards.

\( >40 \text{ yrs (40-45yrs) } \Rightarrow \text{Africans.} \)
INDICATION FOR TRUS GUIDED BIOPSY:

1. Malignancy
2. Evaluation of prostate nodule
3. Before intervention for benign disease

4. PSA:
   - >4 ng/ml @ any age
   - >2.5 ng/ml @ >60 yrs
   - >0.6 ng/ml @ >40 yrs

Most sensitive >0.75 ng/ml/yr PSA VELOCITY

FREE PSA < 10-15% of Total

12 QUADRANT TO 16 QUADRANT BX:
TUMOUR MARKER

1) PSA
glycoproteins
Mol. wt. - 32 KD
7% carboxylic acid
Liquification of semen
Serine Proteinase
Lysine Arginase
It can exist in 2 forms

FREE
↑↑ in Benign Ds.

PSA
BOUND
↑↑ in Malignancy

Malignancy → Damage to Basement Membrane

Free access of PSA to Blood

↑ Bound PSA binds to Albumin form

Bound to PSA
27. PSMA [Prostate specific Membrane Ag]
3. PCA3 / DD3
   - most sensitive marker for Ca
   - urine based marker
   - it is also known as EPCA-2 (Early Prostate Ca Ag)
4. AMCA
   - 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 Ph. ↓ Ca
   - ↑ Ca Br.
   - ↑ Ca Bladder
9. Annex A3
10. GSTP-1 [Glutathione S transferase protein-1]
11. RASSFLA
PIRADS - 2 [MRI Based]

→ 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
WAITFUL
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) $T_1 \neq T_2$
3) PSA < 20 ng/ml.
COMPICATIONS

1) Erectile Dysfunction
2) Urinary Incontinence

<II> RT

1o THERAPY

ADJUNCT TO Sx

Sx F/B RT

↓

4f

1. Relapse
2. +ve margin

RT

3D-CRT

(3D conformal RT)

IMRT

(Intensity modulated RT)

6 7 8

70-80 Gy (avg 76-78 Gy)

for 6 weeks

COMPICATIONS OF RT-

Radiation Induced

Practitis

Cystitis

Small Bowel Enteritis

S. Bowel

L. 45 Gy % threshold
ACTIVE SURVEILLANCE

3 MONTHLY - 6

During the monitor
PSA
TRUS
DRE

INDICATIONS

→ Low Risk
→ Moderate Risk

Ca prostate

AMIACIO'S CLASSIFICATION

LOW RISK

T₁
T₂a
PSA < 10 ng/ml
G.S. ≤ 6

INTERMEDIATE RISK

T₁
T₂a-b
PSA < 20 ng/ml
G.S. = 7

HIGH RISK

T₂a + above
PSA > 20 ng/ml
G.S. ≥ 8
ACTIVE SURVILLANCE -
3-6 monthly PSA
TRUS
DRE

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

LOW RISK - T₁, T₂a
PSA < 10 ng/ml
Glisson's score ≤ 6

INTERMEDIATE RISK - T₁, T₂a-b
PSA < 20 ng/ml
G S = 7

HIGH RISK
T₂c and above
PSA > 20 ng/ml
G S > 8

WAITFUL WATCHING
>75 years
Simple Observation
My of ADV. PROSTATE CANCER

H/c Site: Metastasis ⇒ Bone ⇒ Lungs

Bone: Lumbar V. ⇒ Head of Femur ⇒ Pelvis

2° to Bone ⇒ Ca Prostate > Ca Breast > RCC >
Ca Thyroid > Ca Lung.

METASTATIC CA PROSTATE
⇒ CASTRATION

DHEA ⇒ Testosterone

Testosterone

Ps

Testis

Subcapsular orchidectomy

Androgen ABLATION

Subcapsular ORCHIDECTOMY

(CHARLES HUGGINS) Procedure

LHRH

(T)

LHRH Agonist

LHRH Antagonist

Androgen Blocker

1) PROSTATIC FLARE (16-18 days)

Surge in Testosterone Levels due to LHRH

So, we add Androgen Blocker for 2 weeks
2) CV8 events
3) Osteoporosis

\[ \text{MCRPC (Metastatic Castration Resistant Prostate Ca)} \]

**DRUGS**

1) Abiraterone
   
   **anti CYP17**
   
   Blocks 17α-hydroxylase

2) Docetaxel

3) Ipilimumab
   
   Also used for Malignant Melanoma

**Sipuleucal**

\[ \text{T} \xrightarrow{} \text{CD54 extract} \]

Ant: Prostate Cancer Vaccine

**Prost-vac**

- Pox virus based.
  - Anti Prostate Cancer Drug.
TESTICULAR CARCINOMA

GERM CELL

SEMINOMA
1) Classic
2) Spermatocyte
3) Anaplastic

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

NON-GERM CELL
1) Leydig cell Carcinoma
   (H/c non-germ cell
    Reinke's Crystal)
2) Sertoli cell Tumour
3) Granulosa cell Tumour
   (Call Exner Bodies)
4) Androblastoma

H/c type of germ cell Tumour
Overall = Seminoma
>60 yr = Lymphoma
20-60 yr = Seminoma
15-19 yr = Leukemia >> Seminoma
<15 yr = Yolk sac Tumour
   (Children
    pre-puberal)

Extra TESTICULAR = TERATOMA

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

Most Malignant Germ Cell Tumour = Embryonal
   Cell Carcinoma
Hematogenous spread: Chorio CA
Brain metastasis
Spontaneous Haemorrhage
Chemo Resistant = Teratoma
Para Testicular Malig = Adenomatoid Tumour of Epididymis

H/CSite for soft tissue sarcoma in Testis
= Epididymis

H/CSoft tissue sarcoma = Liposarcoma

In children
Rhabdomyosarcoma

H/C chromosomal Ab(N) = 8 12p
(Extra Copy)

H/C tumour of Tunica Vaginalis = Mesothelioma

ITGN (Intra Tubular Germ cell Neoplasm)

ITGN = Carcinoma of Testis

ass E 8 12p (Extra Copy)

gives rise to ALL GCT except Spermatocytic Seminoma
RISK FACTORS FOR CA TESTIS

1) CRYPTORCHIDISM
   4-6 times.

2) PERSONAL R/F
   Radiation
   Heavy metals
   Smoking

3) FAMILIAL R/F

4) ITGN

SEMINOMA

Grayish white
Nodular
Scaly
Firm
Sheets of cells separated by trabeculations
↑ Lymphocyte infiltration.
UL (≤2% - B/L)
ass. E. SARCOIDOSIS

TUMOUR MARKERS:
++ CD117
- CD30
++ LDH
- α FP
+ β HCG (in 10-20% only)
Spermatocytic Seminoma -

Type of seminoma
Not acc. to 12p
ITGN
BL

also -CD117

Embryonal Cell Carcinoma

Contains Pleuripotent malignant cells
Diffuse areas of H'ge & Neurrosis

Tumour Marker

†† LDH
††AFP
††βHCG
-CD117
††CD30
AE1+/AE3+
OCT3+/OCT4+

Chorio Carcinoma

Tumour ass & syncytecyto - trophoblast
↑ Hematogenous spread
Hc TUMOUR FOR Bone Brain Mets
ass & Spontaneous H'ge

Tumour Marker

††LDH
††βHCG
††AFP
YOLK SAC TUMOUR
or
ENDODERMAL SINUS TUMOUR

Mic 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
Chemoresistant
Neg. for most Tumour Markers
(may be +ve for AFP)

⇒ GROWING TERATOMA SYNDROME.
rapidly growing Teratoma = infiltrates into
local structures
in-resectable

⇒ TERATOMA CONVERSION TO SOMATIC MALIGNANCY:
Adeno Ca
/\
Neuro ectodermal
Rhabdomyosarcoma
**Feature of Test. CA**

1. Painless Hard Testicular Mass
2. Dull aching sensation/ heaviness
3. Infertility
4. Gynecomastia

**Mx:**

- **Painless Hard Mass**
  - USG
  - Evaluate mass
  - Features % of malignancy
    - ↑↑

**Diagnosis:** Testicular CA

- FNA or biopsy is c/I due to lack of spillage

- **High Inguinal Radical Orchidectomy**

  - Trans Scrotal approach
  - Repeat 5-3
  - Sr. AFP / β hCG
  - LDH-1 after 7 days

High Inguinal: deep ring
Sup. Ring

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
PERSISTENT
T Level
Residue?

INDUCTION
Chemotherapy
3 cycles of BEP
Bleomycin
Etoposide
Cisplatin.

INVERTED Y

HOCKEY STICK

BIOPSY

SEMINO MA
NON SEMINO MA

STAGE 1

Bleachytherapy
Docetaxel
Hockey stick
Inverted Y

STAGE 2

CT + RT
3 cycles of BEP
80 Gy
3 cycles of BEP
25 Gy
No node of
6 mo.
Retropertitoneal
L.N. Dissec.

STAGE - 1

CT + RT

STAGE - 2

Induction CT
3 cycles of BEP

CECT Abd

Stage 3 = RPLND → CT + RT.

If LN seen

Retropertitoneal
LN Dissec.
CA PENIS

PREMALIGNANT

ERYTHROPLASIA
OE
QUEYRAT
Cis of glans/ prepuce
+ non-keratinised
Penile shaft

BOWEN'S
DISEASE
LOWENSTEIN

BUSCHKE-LOWENSTEIN TUMOUR

Cis of verrucous
Keratinised
Penile shaft &
Perineum

Locally aggressive
Lesion is often
infiltrate into
deeper str.

seen in Penis & Anus

[BXO] Balanitis Xerotica Obliterans
> also kIn Lichen sclerosus et atrophicus
> chr. sclerosing inflammatory lesion affecting
glans/ prepuce

> may involve any age group.

FEATURE -
1) Phimosis - non retractile foreskin
2) Collagenisation of Dermis
3) Loss of Rete pegs in Dermis M/C
Mx: Long term (3-4 wk) Antibiotic course ↓ F/B Circumcision.

Pediatric Phimosis
upto 5 yr observation
After 5 yr - if persists → go for Circumcision

Penile Carcinoma

Histotype - SCC

Histotype - Glans → Prepuce → Glans + Prepuce → (21%) (9%) Penile shaft

Risk Factors:
1) STD
2) HPV 16, 18, 21
3) Immunosuppression
4) Smegma [Circumcision & protective]
5) Geography Brazil → Max.
   Israel → Least

Features:
- Painless
- Micro Proliferative lesion
- May bleed on touch
STAGING

T_1 → Subepithelial
T_2 → Into corporeal bodies
T_3 → Into urethra
T_4 → Local structure

LN → Sup. Ing → INGUINAL BLOCK
    → Deep Ing
    → Obturator

Para Aortie → ileac

Mx

Wide local excision & 2cm Margin
+/- Inguinal Block Dissection

2cm

Total penile amputation & proximal penile growth
WILM'S TUMOUR
NEPHROBLASTOMA

H/c type of tumour in children. (w.r.t Genito
ureinary Tract)

AGE: 3 yrs < Max. Incidence
2 ——> 5 yrs.

FEATURES—
1) FLANK MASS— H/c clinical Presen'
2) Hematuria
3) HTN
4) Wt. Loss
5) Pain is least common.

Spontae > > Familial
U/L

FAMILIAL WT
ass ± WT₁ /WT₂
Chromosome 11

1) Denny's DRASH
Nephropathy
Gonadal Dysgenesis
WT₁

2) Beckwith-Weidmann Sy.
Midline abdominal wall defect
Macro-glossia, visceromegaly,
Hypoglycemia
3) WAGR [Wilms' Tum, Aniridia, GU Abn, Retardation]

4) Li-FRAumeni

7q -

15q

IOC = CT SCAN (CECT)

C-XRY = Lung Mets

TYPES

FAVOURABLE PROG

a/b/c

epithelial cell

stromal cell

> Blastemal cell

UNFAVOURABLE PROG

WT c

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

III - incompletely resectable tumour

or

Lymphatic extension.

IV - Hematogeneous spread

V - Bil WT
INDICATIONS FOR NEO-ADJUVANT CT

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

CT → DAUTINOMYCLIN

↓
VINCRISTINE

RX

Sx = RADICAL NEPHRO-URETERECTOMY

Ureter removed as much as possible

INDICATIONS FOR PARTIAL NEPHRECTOMY

If all the cond. are satisfied,

1) Tumour confined to Pole
2) No capsular
3) No lymphatic
4) No vascular
5) No collecting duct invasion
BPH (Benign Prostatic Hyperplasia)

M/L site -
Median Lobe; Lateral Lobe

M/L zone - Central / Peri urethral zone

STROMA - GLANDULAR DISEASE
Stroma @ glands → Involves Epithelium

Internal sphincter controls

 Ejaculatory duct

Vesico - Verramontanum

Ext. sphincter 
continent

PATHOPHYSIOLOGY -

Hyperplasia of prostate

Growth is untailed by
Prostatic capsule

→ Prostate urethra gets compressed

↑ Back Pressure

Bladder wall changes
↑ compliance

By Detrusor Hypertrophy
Bladder Decompression
\[ \downarrow \]
Trabeculation
\[ \downarrow \]
Diverticulation
\[ \downarrow \]
Sacculaition

**Complications**

1) Obstruction
2) Urinoma
3) Urine Retention
4) Incontinence → Urge Incontinence
   \[ \downarrow \]
   Overflow Incontinence
5) Bladder outlet obstruction → Stone
6) Infertility (Rare)
7) Hematuria (Decoy Prostate)
   \[ \downarrow \]
   Rupture of peri-prostatic venous plexus

**Symptoms**

LUTS (Lower Urinary Tract Symptoms)

By Paul Abraham
**VOIDING**

- Hesitancy
- Poor stream
- Stuttered micturition (Intermittent flow)
- Post void dribbling
- Sense of incomplete evacuation (near retention)

D/D of LUTS

1) BPH
2) EA prostate
3) Bladder outlet obstruction
4) Stricture urethrae.

**MARRION’S DISEASE** → Idiopathic hypertrophy of bladder neck & internal sphincter ↓
Bladder outlet obstruction

5) Neurogenic Bladder.
   - Age & Injury
   - Parkinson's
   - DM
   - Tabes dorsalis
A's

1) TRUS + PSA + DRE.

Baseline level → Access prostate volume → PSA velocity

5α Reductase Inhibitors cause:
1) PSA by >50% after 6 months of therapy

For LUTS

1) UROFLOMETERS
   Urine flow rate
   >15-22 mL/sec → ☑
   <10 mL/sec → ☑️
   10-15 mL/sec → equivocal

Best test for LUTS
Min 150 mL of urine output must be voided
No age correction is needed

Q_max = Max. Vel. ⇒ MORE IMP.

Q_avg = 'Avg. velocity

B obstruct = Dynamic - stone

A obstruct = CONSTANT = malign [BPH]
2) PRESSURE STUDY:
   N) Voiding Pressure < 60 cm H₂O
      Equivocal 60-80 cm H₂O
      Ab N) > 80 cm H₂O

3) PRESSURE FLOW STUDY -
   a) Low Vel. High Pressure → Obstruct
   b) Low Vel. Low Pressure → Neurogenic

Mx

MEDICAL
1st Line
1) α BLOCKERS (1st Line)
   PRAZOSIN → Libido
   TAMSULOSIN → Orthostatic Hypo tension
   UROSELECTIN → Blocker
       \[ ALFuzocin \]
       \[ SILDOSIN \]

2) 5α REDUCTASE INHIBITORS (DOC)
   FINASTERIDE - Type II Blocker
   DUTASTERIDE
       (Type I & II Blocked)
   \[ PSA > 50% \] in 6 months

INTERVENTION

ENDOSCOPY
TURP
TUVP
TUIP
TUMT
TUNA
LASERS
PUL
STENTS

Sx

1) SUPRAPUBIC
   [FRAVER'S]
2) RETROGRADE
   [MILLIN'S]
3) PERINEAL
   [YOUNG'S]
   1st
INDICATIONS FOR INTERVENTION

1) Acute Urine Retention - Most Imp.
   R/o = Foley's Catheterisation fails
   SPC (supra pubic catheterise)

2) Recurrent UTI
3) Recurrent/Severe Hematuria
4) Recurrent Chronic Urine Retention
5) Bladder outlet obstruction
6) Stone
7) Diverticulation/sacculcation

TURP

Resection of Prostate via electric loop
Anaesth = SPINAL
K/n Resectoscope
Platinum: Iron Medium Alloy (80:20)

TYPE

M-TURP (monopolar)
1.5% glycine or Mannitol

B-TURP (bipolar)
0.9% NaCl (TURIS) + Tri. Methoim Resection in Saline

Irrigant used
**M-TURP**
- More Complication
- Longer Hospital Stay

**B-TURP**
- Less
- Shorter

Tech: TURP started @ Median (Middle Lobe)

![Diagram]

(@ Level of Bladder Neck)

Resection of Lateral Lobes

**NESBIT Approach**

1. Min. Flow Rate of fluid required for adequate vision = 300 mL/min
2. Min. Rate of fluid absorption = 20 mL/min.
3. Avg. Duration of TURP = 50 min. 00
4. Adequate height of water column = 60 cm above the operating site

![Diagram]
COMPLICATION:

\( \alpha \) - Operating Time

H/C overall → Retrograde Ejaculation

\( \sqrt{v} \) - Dilutional Hypotension.

Intra-operative → Bleeding

OTHER:

1) Perforation

2) Intra-operative PRIAPISM

RXC = \( \text{Inj} \) Phenylephrine (8%) in 100ml NS

3) Stricture

4) TURP SYNDROME / WATER INTOXICATION

\( \rightarrow 1.5\% \) Glycine

Causes Dilutional Hypotension.

\( 20 \text{ml/min} \rightarrow \text{avg. due} \) 50ml

\( \Rightarrow 1000 \text{ml} \)

\( \text{Na}^+ 140 \text{mEq/l} \rightarrow 6 \text{l} \)

NOW \( 140 \text{mEq/l} \rightarrow 7 \text{l} \) Dilutional Hypotension

If \( \text{Na}^+ < 120 \text{mEq/l} \rightarrow \text{TURP SYND} \)

(Water Intoxication Syndrome)
a) HTN
b) Brady cardia
c) Nausea, vomiting
d) Visual disturbance due to cerebral oedema
e) Altered syndrome.

RX: 3% NaCl → Slow Infusion (100 mL → 2-3 hr)
Rapid Infusion

TUVP
(Trans Urethral Vapourisation of Prostate)
Resection via Electrodes

ADVANTAGE - No risk of Retrograde Ejaculation

DISADVANTAGE - ↑ Bleeding
              Longer Hospital Stay
              Infertility

TUIP
(Trans Urethral Incision of Prostate)
Prefered by young male concerned about
Infertility & Retrograde Ejaculation

Colling's Knife - Infertility /
5' 7' o'clock
6 extend et unto verumontanum
TUMP
[Trans Urethral Microwave Therapy]

Thermal Ablation of Prostate
Temp > 65°C used
<65°C → Therotherapy

DISADVANTAGES:
can't be used for
>80g or <20g in gland

TUNA
(Trans Urethral Needle Ablation)
Thermal Ablation

LASERS
1) KTP → K+ Titanyl PO43−
   λ = 532nm

2) Nd:YAG → λ = 1064

3) Yttrium λ = 2018 nm
   ASS = Peeling of Prostate

4) Holmium
   2130 nm
   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 → Photosselective Vapourisation of Prostate
Use Green Lasers (KTP)

VAP → Visual Ablation of Prostate
Use holmium
Pts of Anti-coagulation.

CORNEA
↓
Holmium
Yttrium

PUL
(Prostate Urethral Lift)
- Non. Surgical cure of LUTS in BPH by
  Trans prostate Placement Spring loaded T shaped sutures
- Spring Recoil + cause opening of Prostate Urethra

DANGEROUS

Retina
Nd YAG
Carbon
KTP
Lithium Borate
GENITOURINARY TB

H/c SITE = KIDNEY >> Epididymis
(Teestes → never involved)

H/c Route of spread = Hematogeneous

H/c clinical Presentation = Sterile Pyuria »
Hematuria

RENAL TB

Renal Pyramids - INDEX SITE

→ RP Granuloma

→ Casseous Neucrosis

→ Abscess formation
PUTTY KIDNEY - GROSSLY NECROSSED PUTRIFIED KIDNEY

Cement Kidney
Shrunken
Calcified
Fibrosed
Non-functional
[Auto-Nephrectomy]

PUTTY KIDNEY
↓
Casted
Cavernous type

CEMENT KIDNEY
↓
Fibrous Type

MILLIARY TB → Numerous small (<3mm) granulomas representing seed of millet

BLADDER TB

Spared
M/c Site → Dome

Trigone
Bladder Neck

THIMBLE BLADDER
Contracted, non-functional
**EPIDIDYMAL TB**

2nd H/E site of TB
H/E site → GLOBUS MAJOR

**PENILE TB**

Rare type
a/c DIRECT spread
(by contact infected stool)

**TYPE**

- OROFACIAL Penile TB
  - Painless
  - Keratotic Patch over glans / Prepuce

- Severe neurotising ulcerative lesions over Penis
  - Painful
  - Surrounded by pseudo membrane

**PNT**

[ Papulo Neutrotic Tuberculosis]

- Hypersensitivity Rxn for Tuberculosis skin Test
- Painless ulceration over glans + penis + b
  - VARIOLIFORM SCARRING + Keratotic Patch
- Culture Negative
- Respond to ATT
Asu → IOC = Culture

NAAT

Screening → Tuber Culm Skan Test

IRMA (Interferon Y Release Assay)

TB-gold → TB-spot

RADIOLOGY

IOC @ Radiology → CT Urography

X-RAY

Calcification

↓

Ring (A)

↓

Stone

↓

Renal Pyramid Granuloma

TB

IVP - IOC for early GUTB

Moth Eaten Calyces

Phantom Calyx → Invisible Calyx

Oncocalyx

URETER → Rigid, Pipe Stem, narrow, Beaded

KERR'S MINK - Sharp, Acute UPJ

Golf Hole Ureter

Rx → ATT 6 months
URO TRAUMA

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
    Hilar Injury
    (In spleen → Hilar Injury - Grade 4)

IVC → NCCT & 10 min delayed film.
Unstable Pt → IVU (single shot) → 8 minutes delayed ICM
R.TRAUMA

PENETRATING

\[ S_x \]

REPAIR

RENOGRAPHY

BLUNT

UNSTABLE

CT SCAN

STABLE

Single shot IVU

Injury ±+

Na Injury observation

\[ C_1 \]

\[ 9.5 \]

\[ 1,2,3 \]

\[ \text{obs} \]

RESECTION

NEPHRECTOMY

% Functional Reserve

> 20%:

Partial Nephrectomy

< 20%:

Total Nephrectomy
URETERIC TRAUMA

H/c - Iatrogenic
To c - Retrograde Pyelogram

Mx

SITE
Upper 1/3

End to end
Ureter - Ureterostomy

Middle 1/3
- Same -
-> End to Side
Ureter - Ureterostomy

Lower 1/3
Ureteric Reimplantation

All repairs are done over Plastic Stents

In case of Length Discrepancy - BOARI's FLAP

PSOAS HITCH

Kidney to psosas

RENAL HITCH

End to end
(PREFERRED)

End to side
Trans implantation
Re-Implantation

Boari's - U shaped incision of bladder. Flap

U - Levelling up
Mest bladder approximated

Tubularisation of bladder wall was lifted up.
BLADDER TRAUMA (M/c: Cystogram)

EXTRA PERITONEAL

INTRA- PERITONEAL

ROC = Foley's Catheterisation for 10-12 days

URETHRAL INJURY

Pubo Prostatic Ligaments

Prostatic U. I

Membranous U.

Bulbar U.

Penile U.

ANT. U. INT.

3, 4

Straddle Fence Inj.

Pos U. INT.

Part Inj:

1, 2

Cause Pelvic

Chemical Peritonitis

Bacterial P.

Acute Abdomen

Sx

Urgent Surgical Exploration

F/U repair 0-2-0

vycyl.
FEATURES

Anuria

Blood at meatus

Perineal Hematoma or Butterfly

High Riding Prostate

(Vermooten's Sign)

Mc Callum Colapinto Classification

u. Urethral inj (Posterior)

Ioc - Retrograde Urethrogram (RGU)

(Or flexible cystoscopy)

RGU

No Injury

Foley's Catheterisation

Injury detected

Diversion

SPC

Realignmen by

Coulde or coulce

Tip Catheter

(By Mitchell & Blom's Technique)

Dejenite Replacement

Rail Road Tech.

8-12 week
COMPlications

structure  H/c  structure
Impotency  Incontinence
(may be seen in  Infertility
penetrating Penile  Trauma)

Penile Trauma (#)

H/c = Violent Sexual Activity

Tunica albuginea  \(-2\text{mm}\)  \(\rightarrow 0.5\text{m}\)  on erection

Sudden loss of erection (Detumescence)

\(\circ\) Pop/Snap sound
\(\circ\) Swelling @ base of penis

[EGGPLANT DEFORMITY]

Mx -> all penile # are immediately repaired by 2-0 Vicryl
FASCIAL LAYERS OF PENIS

SUPERFICIAL

- Outer
- Inner

DARTOS

BUCK

CONTINUOUS

SCARPA ➔ above

COLETTI ➔ below

of perineum

SCARPA

DARTOS

COLETTI

1. T. A. MURPHERE
   Buck's F ➔ intact ➔ SLEEVE
   or CYLINDRICAL
   hematoma

2. T. A. MURPHERE
   Buck's F ➔ BUTTERFLY /
   PERINEAL
   hematoma
VESICOURETERIC REFLEX

1°

due to obstruction to bladder outlet

L : W = 5:1

Q : W < 5:1 → 1° VUR

Intramural ureteric length

1°/2° VCU (voiding cysto-urethrogram)

STAGING

I  Reflux into ureter

II Reflux into ureter + kidney

III + Mild blunting of calyx

IV III + Dilatation of ureter + effacement of calyx
Recurrent UTI - H/c presentation

\[ M_x \]
\[ 1 \]
\[ 2^\circ \]

Grade 1, 2, 3 - Conservative
Antibiotics

Grade 4, 5 - Intervention

Endoscopic Sx

STING Procedure

1) Cohen's Cross
2) Lead better Politano

Diagnosis of Distortion of Urinary Pelvis and Calyceal System

Effacement of Calyx

Dilatation of Ureter + Distortion
5:1
3:1
\[ \frac{3}{0.5} = 6:1 \]

Cohen's cross trigone implantation

CRYPTORCHIDISM

1. Undescended Testis
   Non descent of Mid-point of Testis below midpoint of Scrotum

2. Stable Descended Testis → Intra-scrotal Testis but mid-point of Test is above the mid-scrotum

RETRACTILE TESTIS - ński descended Testis but move up due to cremasteric reflex hyperaemia
VANISHING TESTIS - Testis was present in embryological phase but absent on BIRTH

Time of DESCENT → 5 months
Spontaneous descent occurs up to 5th month.

Rx -
Time of $s_x = 6$-12 months.
$6'' < 12''$ month.

$s_x =$ ORCHIDOPEXY → Bringing down the testis in subdartos space

STEPHEN FOWLER $b_x$

STEP 1
- Ligate Testicular artery
- AIM - Lengthening of cord
- Stretch the cord to max + fix it

STEP 2 → Wait for 6 months → ORCHIDOPEXY
TESTICULAR TORSION

CAUSE -
1) Inversion of Testis (H/c cause)
2) High Investment of Tunica vaginalis
3) Cord bell "Epidymis + Testis"

Max - 10-20 yr
Peak - 13-14 yr
Golden hour - 1st 6 hr
Only 20% salvage after 24 hour

1) Exruciating 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 appendage testis
COMP-
1) Loss of viability
2) Complete necrosis
3) Sympathetic orchidopathy

IOC - USG
Doppler study (for viability)

\[ \frac{M_x}{1} \]

VIABLE

NON-VIABLE

Derotation of fixation of testes

+ Prophylactic fixation of contralateral testis

+ Orchidectomy
CLEFTS

Cleft Lip + Palate $\Rightarrow$ Cl. Palate $\Rightarrow$ Cl. Lep alone

$\theta > 60^\circ$
Left
U/L

M/c Chromosomal Abnormalities $\Rightarrow$ Chr. 22p

M/c Syndrome $\Rightarrow$ VANDER WOODE SYNDROME
(Velo Cardio Facial Defect)

Cleft + Lep / Facial Pet,) Sinus / Fistula

PIERRE ROBIN'S SYND.

Glossophtosis $\rightarrow$ Falling back of tongue

Micrognathia
Retrognathia

Cleft Palate (alone)

CLEFT LIP

INCOMPLETE

any cl. Lep is intact
nasal cavity

COMPLETE

cl. Lep extending into nasal cavity
Maxillary Process /\ Nasal Process
\
\[ MP \quad NP \] /\ \[ NP \quad MP \]

CENTRAL CLEFT
Rare LCP Defect (rare)

LATERAL CLEFT LCP

CLEFT PALATE

INCOMPLETE
Any cleft palate = Intact fusion of palatine shelves \[ C \]
\[ \text{nasal septum} \times \text{vomer} \]
Type II

COMPLETE
Non-fusion of palatine shelves \[ C \]
\[ \text{nasal septum} \xrightarrow{\text{Vomer Bone}} \]
Type I

PATE

1° ant
Incisive Foramen
\[ \text{upper LCP} \]
\[ \text{alveolar ridge} \]

\[ \text{Parts} \]
\[ \text{Hard Palate} \]
\[ \text{Soft Palate} \]

\[ 2° \] Post
Complete

Incomplete

II a. cleft of uvula

II b. Cl. of uvula + soft palate

III c. Cl. of U + Soft Palate + hard palate

Alphabets damaged in speech

D  K  Bose  P C T.

Cleft Lip

Tennison’s Z-plasty

Millard Rotator flap

Cleft Palate

1) Farlow Sx

2) Teisser’s Sx

Single step repair

3) Wardell Killner

2 step repair

Timing of Repair

Cl. Lip alone → 3-6 mths.

Cl. Soft palate → 6-9 mths

Cl. Lip + Soft palate → 6 mths → 6-9 mths

Cl. Hard palate → 9-12 → 18 mths

Cl. SP + HP → Single stage → 9 m
2 stage

6m → SP

12-15m → HP.

RULE OF 10 (Milward)

Cl. LIP

> 10 weeks old

> 10 pounds

> 10 gm Hb

Cl. PALATE

> 10 months

> 10 kg

> 10 gm Hb%
THYROID

EMBRYOLOGY
Development starts at 3rd week of life
Ultimobrachial Body

Lateral Part
Homed Part
Faramen of Calcium

=F = Thyroglossal duct (helps in descent of medial part)

Fusion = 5th week

Follicle = 5 + 3 = 8th week
Colloid formation occurs in 8 + 3 = 11th week of life.

Regression of Thyroglossal duct starts @ 5th week
Completed @ 8th week

DEVELOPMENTAL ANOMALY -
1. Thyroglossal Duct Cyst / Fistula QQ.
2. Persistent Thyroglossal Duct due to failure of Regression by 8th week of life.
   - Midline swelling & more to deglutition & protrusion of tongue
Epithelium: pseudo-stratified Columnar Epithelium. (ciliated)

Mucin secretion \(\Rightarrow\) cyst formation
H/c location: subhyoid
Infrathyroid
H/c long. anomaly of thyroid.

<1% Risk of malignancy
4 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] rupture of cyst or [iatrogenic]

\(R_x = TGD/Fistula = SISTRUNK Sx\)

[Excision of cyst + this Sx is also done for chronic lymphedema}
Wedge resection excision of subcutaneous tissue
2. **LINGUAL THYROID**

- Not ectopic thyroid
- Persistent thyroid tissue & base of tongue
  (foramen of caecum)

![Diagram of TSH and dysphagia](http://mbbshelp.com/whatsapp)

**Hypothyroidism → Hypothalamus**

\[ \text{TRH} \]

\[ \text{Pituitary} \]

\[ \text{TSH} \]

**Rx = Thyroid suppression by } T_{9} \text{ supplementation.**

Preferred Mx = Radioactive Iodine (Abation)

Sx not done due to technical difficulty.

3. **ECTOPIC THYROID**

- High Site = Central Part of Neck
  Trachea
  Esophagus
  Aorto-Pulmonary Window (mediastenum)
LAT (LATERAL ABERRANT THYROID)

- Thyroid tissue located in lateral part of neck
- Considered as skip metastasis from superolateral pole papillary carcinoma

SKIP METASTASIS → as they skip central part
Direct invasion of lateral part occurs

NECK MASS

↓
FNAC

↓

N. Thyroid tissue

Lateral Part = ? Location = Central Part of Neck of Neck
↓
LAT (skip metastasis)
↓

R x = Total
Thyroidectomy +
(ECTOPIC THYROID)

Level 6)
Central Neck Direction +
Modified Radical Neck
Dena’.

(ровel 1-5 removed)

MALIG NANCY
↓
Total Thyroidectomy +
Central Neck Dissection.
5) **PYRAMIDAL LOBE**

- Persistent fibrous attachment of thyroglossal duct = thyroid

- Usually not palpable.

**ANATOMY**

- WT = 18-20gm
- Colour = Brown

**Berry's Legament**

- Lobes
- Isthmus
- Lobes

Overlies 2nd-6th tracheal rings

**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 left RLN anatomically.

H/c site of RLN injury → Berry's Leg

Infradiaphragmatic type of injury

**ARTERIAL SUPPLY**

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

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

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

STA

Post

Ant

Com. Carotid

Parathyroid

ITA

Post to Carotid sheath

Divide into sup. & inf.

BEAHRO's Δ
Inf. Thyroid artery → Ligated closest as close to the gland as possible otherwise

**VENOUS**

Sup. Thyroid vein → Int. Jugular vein

Inf. Thyroid vein → Innominate vein.

Non- Recurrent Laryngeal N/v → 0.3-1.5%

L NAME 

ARTERIA LUSORIA → Origin of R subclavian, from
ductal to R subclavian artery courting post to
duodenum to reach R side

DYSPHAGIA LUSORIA

- Dysphagia due to R subclavian
due to post-indentation on esophagus.
**Type 1**

Ext. Laryngeal N/V

Related to sup. pedicle

2 cm

SLN > 1-2 cm from S. Thyroid Pedicle

**Type 2**

SLN < 1 cm apart b/w

SLN < ST pedicle

**Type 2b**

Below the Pedicle
**MISC.**

\[
\begin{align*}
\text{TSH} & \quad \text{T}_3 \quad \text{T}_4 \\
\text{N: 0.5 - 5.5 \ \mu U/dL} & \quad \text{Functional Reserve} \quad \text{Production Reserve} \\
\text{T}_4 & \quad 3 \ \text{day} \quad b/2 \quad T_4 + 3 \quad 7 \text{day}
\end{align*}
\]

**HYPOTHYROIDISM**

- TSH
- $\downarrow T_3$
- $\downarrow T_4$

**HYPERTHYROIDISM**

- $\uparrow$ TSH,
- $\uparrow T_3$, $\uparrow T_4$

**SUBCLINICAL HYPO**

- Marginal elevation of TSH
  - $\uparrow T_3$, $\uparrow T_4$

**SUBCLINICAL HYPER**

- Marginal decrease of TSH
  - $\downarrow T_3$, $\downarrow T_4$

**EUTHYROID SICK SYNDROME**

- TSH $\rightarrow$ (N)
- $T_3$, $T_4$ $\downarrow$ (marginal)
- a/e chronic illness

**REFETOFF SYNDROME**

- End organ resistance to $T_4$.
- TSH $\rightarrow$ (N)
- $T_4$ $\uparrow$
- $T_3$ may be (N)
FREE $T_3, T_4 \rightarrow$ 

\[ \begin{align*} &\text{BOUND} \\ &\text{[Thyroglobulin]} \\ &\text{[Prealbumin]} \\ &\text{[Albumin]} \end{align*} \]

\[ T_3, T_4 \rightarrow \text{FREE Functionally Active} \]

FREE $T_4 \propto \text{Negative log TSH.}$

\[ \log \quad T_4 \uparrow \uparrow \rightarrow TSH \downarrow \downarrow \]

**HYPERTHYROIDISM**

\[ \uparrow \uparrow \text{RAI uptake} \]

WHERE GLAND IS TAKING EXCESS OF IODINE

**CAUSES**

1) **Graves Disease**
2) **Plummer's D**
3) **Toxic adenoma**
4) **Drug induced (Too Basedow Effect)**
5) **Malignancy**
6) **Struma ovarii**

\[ \downarrow \downarrow \text{RAI uptake} \]

NO UPTAKE OF IODINE

**CAUSES**

1) **Thyroiditis**
   (Subacute/chronic)
2) **Factitious Thyrotoxicosis**
   (\uparrow \text{exogenous uptake})
3) **HAMBERGER'S THYROTOXICOSIS**
GRAVE'S DISEASE

- Diffusely enlarged
- Warm
- Smooth
- Palpable thrill

Features of Toxicity

CAUSES

> Autoimmune:

- CTLA4 [Cytotoxic T-lymphocyte Antibody 4]
- TS Ig [Thyroid stimulating Antibodies] or TSH receptor antibodies

TS Ig → "Diffuse Toxic Goitre"

- Asso. w/ DR3, HLA B8
- HLA DQA1*501.
- [HLA DR B1*701 → Protective for Graves]

Other = DUMPS

- DM → Grave's Disease
- Pyruvate
- Penicillamine
- Anemia
- Addison's Disease
- Grave's Disease

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
2) Lithium Rx
3) 
4) Injection

FEATURES

THYROIDAL

1> Heat Intolerance
2> Wt. Loss
3> Tachycardia
   Water hammer pulse
4> Palpitations
5> Atrial Fibrillation
6> Diarrhoea
7> Menorrhagia
8> Exaggerated Knee Jerk

EXTRATHYROIDAL

17 E GRAVES OPTHALMOPATHY
   
   1) Von Grafe's Lid lag (upper)
   2) Dacryomyle sign
      Visible upper sclera
   3) Stegwas' Infrequent Stare
   4) Mobius sign - Loss of near accommodation
   5) Tellink sign - Periorbital pigmentation

7) Griffith Sign - Lower lid lag
8) Kocher's sign
    Eye globe lag
9. BALLET SIGN
   Loss of upward \ outward accomodation

10. BOSTON SIGN
    Jerky eye Movement

11. Vigorous sign - chemosis

12. Uппforsd sign - Lack of eversion of upper lid down

13. Groove sign - Inability to retract the upper eyelid

2. SKELETAL CHANGES
   - Subperiosteal Bone formation
   - Thyroid acropathy \ swelling of metacarpals.

3. GRAVES DERMOPATHY
   → Glycosaminoglycan Deposition
   → Pretibial myxedema.

4. Gynaecomastia

5. Thrill - Felt at Superior Pole
**Diagnosis**

1. Hyperthyroidism

2. Antibodies → anti Tg, Tsi9 (↑↑) [Hallmark]

3. **Thyroid Scan**

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

   - Active thyroid → HOT
   - Inactive → COLD

   Element → I$^{123}$, Tech$^{99}$ → $t_{1/2} = 6$ hrs

   $t_{1/2} = 12-13$ hr

   → Y Rays

   Captured by Y cameras.

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

   $Y + B$ - used for destruction.

   So, therapeutic use

   ADV: short $t_{1/2}$

   → Not organized in mitochondria

   → Lesser radiation exposure
I$^{123}$/ Tech 99
\[ \Rightarrow \text{Diffuse Toxic Goitre} \]
\[ \Rightarrow \text{Diffuse uptake} . \]

I$^{123}$/ Tech 99
\[ \Rightarrow \text{Multiple Hot nodules on Cold Background} \]
\[ \Downarrow \]
\[ \text{Toxic Multinodular Goitre} \] [Plummer's Disease].

Tech 99 / I$^{123}$
\[ \Rightarrow \text{Solitary Hot Nodule on Cold Background} \]
\[ \Downarrow \]
\[ \text{Toxic Solitary Nodule} \] (Toxic Adenoma).

Rx

\[ \xrightarrow{\text{DRUGS}} \]
\[ \xleftarrow{\text{RAI Ablation}} \]
\[ \xrightarrow{\text{Sx}} \]

\[ \text{DRUGS} \]

\[ \text{AIM} \Rightarrow \text{to achieve euthyroid state} \]

- Methimazole \( \rightarrow \) C/I in \( \Phi / \text{Lactation} \)
- Propylthiouracil \( \rightarrow \) Safe in \( \Phi / \text{Lactation} \)
- \( \beta \)-Blockers \( \rightarrow \) Avoided in \( \Phi / \text{Lactation} \)
- Steroids
Combimazole \rightarrow "CUTIS APLASTA"

\textbf{DRUGS can be used as 1\textsuperscript{o} Therapy if FOLLOWING CONDITIONS R FULFILLED}

1. Small size Gl. (\leq 40g/m)
2. Negative Antibody titre
3. Moderate Elevation of T_{3}, T_{4}
4. Quick response to Drug.

\textbf{REGIMENS}

- Block \rightarrow Replace \rightarrow Step Ladder Regimen

\underline{\textbf{R\textsuperscript{AI} Ablation}}

\(I^{131}\rightarrow \beta\) property

\textbf{Indication :-}

1. Moderate size (<80g/m)
2. Elderly
3. Not responding to drug
4. Remote location residents

\(\frac{C/I}{:}

1. Young \textbf{f.}
2. \(\uparrow\)
3. Lactation
4. Smokers
5. Graves opthalmopathy
Smoker $\xrightarrow{RAI}$ Graves $\xrightarrow{RAI}$ Worsening

$Sx_{OC} =$ Total Thyroidectomy / Near Total / Sub Total

- Preserve 1 gm of thyroid @ Berry's Ligament
- Leave 4-7 gm of thyroid

HARTLEY
DUNHILL $Sx$
7-8 gm on 1 side

INDICATIONS FOR $Sx$:

1) Young $pt$
2) Gland > 80 gms (Large)
3) $\emptyset$ ($Sx$ in 2nd Trimester)
4) Lactation
5) Desire to conceive in 6 months
6) Smokers
7) Graves Ophthalmopathy
Toxic Multinodular Goitre

Elderly

MN Goitre
Long standing
Long term
Amiodarone
I\textsubscript{2} supplementation.

Features of toxicity
Long standing suppression generates autoactivation of the thyroid nodules

Features
Only feature of Hyperthyroidism seen
No extra-thyroidal feature
M/c - Atrioventricular Palpitation

Rx
\begin{itemize}
  \item \textbf{SX} \hspace{1cm} 2. Preferred
  \item \textbf{RAI Ablation}
\end{itemize}

\textbf{DISADV:} Dose of radiation may be too high.
At the dose there is risk of development of radiation thyroiditis.
TOXIC ADENOMA (SOL. TOXIC NODULES)

Young pt.
Solitary nodule
Long standing nodule turning autonomous
→ toxicity

Avg. size = > 3 cm
a/c gsp mutation → G → q coupled protein.
   s → stimulation.
   p → protein

Rx = Sx (Hemithyroidectomy) is preferred.
   [young age, avg. size > 2 cm]

Other → RAI Abr → Small nodules
       Middle aged → elderly

(TRIAL) → PEI (percutaneous ethanol injection)

APATHETIC THYROTOXICOSIS

→ Rare type
→ Seen in elderly
→ overt c/f of Hyperthyroidism. are not seen
→ Rather few subtle features may be seen.
FEATURE

1) Rate * Rhythm Disturbance
2) Myalgia
3) Depression
4) Anxiety

\[
\text{Rx}
\]

1st Line → Antithyroid Drugs

↓ fai.

RAI Ablation (ToC)

Sx & clI.
THYROIDITIS

SUPPURATIVE / ACUTE
→ BACTERIAL CAUSE

SUBACUTE ↓ DE-QUERVAIN

CHRONIC LYMPHOCYTIC ↓ HASHIMOTO'S

CHRONIC SCLEROSING ↓ REIDEL'S

3> PAIN ↑ + +

Viral + + +

Initially + +

Later (-)

Viral

PP (-)

Euth.

Hypothyroid Hyperthyroid

Initially

Euth >> Hyper

5> Leucocytosis

+++ -

6> ESR

↑↑

Viral ↑

PP (N)

7> Ascites

FNAC

FNAC

Biopsy

8> Mx

Conservative

Conservative

Tg supplementation}

Steroids

Tamoxifen

Malignancy

Lymphoma

Papillary
ACUTE / SUPPURATIVE THYROIDITIS

H/Co In children.
H/Co org. - Staph. aureus > Strep.

TRIAD: Painful / Tender Thyroid.

Euthyroid
↑ WBC / ↑ ESR
N/↑ RAIU.

Rx - Conservative

Sx - Done for recurrent acute thyroiditis.

DeQuervain Thyroiditis

2 Types

VIRAL
Painful
↑

Post-Partum
Painless

<table>
<thead>
<tr>
<th>Viral</th>
<th>Post-Partum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Painless</td>
</tr>
<tr>
<td>ESR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HLA-B34</td>
</tr>
<tr>
<td></td>
<td>Thyroid status</td>
</tr>
</tbody>
</table>
Phases of Hyper → euth.

\[ \text{Phase of Hypo} \]

\[ \text{Euth.} \]

Rx: Symptomatic care

**HASHIMOTO'S THYROIDITIS**

Also known as STRUMA LYMPHOMATOSIS

- 0: 0 → 10:1 → 20:1.
- \( > \frac{2}{3} \text{a} \) → Premenopausal Age.
- Autoimmune → HLA DR3/DR5/DBB
- Syndrome → 1) Down Syndrome
  
  2) Turner Syndrome

**FEATURE**

1) Painless gland (Pairs may be seen in early gland)
2) Hyperthyroidism
3) Firm, granular, Bosselated Gland

\[ \text{Phylloide T} \]

4) Microscopy

- oxyphil cells
- Askenazi cells
- Lymphocytes
- Plasma cells
- Eosinophils
Δsiu → ↑↑ Antibodies (antimicrosoma)
  anti TPO
  anti Tg
  anti NA-I sympporter

Hx →
  → T4 Supplementation

27 TSH > 10 → Start T4

  5-10 μU/ml
  ↓
  ↓
  ↓
  ↓
  ↓

  check Antibodies
  → Not elevated
  thankful
  observation

3x → Malignancy

  Lymphoma > Papillary
  Dephrue B cell lymphoma

REIDEL'S THYROIDITIS

![Diagram of thyroid showing hard, woody gland]

  Hypothyroid
  ↑ T4
  ↑ T3

Biopsy → IOC

Mx → C. Steroid / Tamoxifen

Sx → compression [1st hematoma]
**SOLITARY THYROID NODULE**

IOC - USG guided FNAC

- Blind FNAC = High False Negative

**USG FEATURES S/O MALIGNANCY**

1. Taller than wide
2. Microcalcification (<5mm)
3. ↑ central vascularity
4. Irregular border
5. Heterogeneous appearance

**THYROID NODULE**

- TSH
  - Low
    - Thyroid Scan
      - Hot
      - Cold
        - >1cm
        - <1cm
          - Observation 6 monthly by USG
        - Observation
      - Cystic
      - Solid
        - Aspiration
          - Benign
          - Observation
          - Malign
            - Observation
              - Reaspiration (x2 times)
            - Recurs
              - FNAC
                - Benign
                - ? neoplasm
                - Sx
                - Hurthle cell
                - Undetermined follicular cells
Unetermined Follicular cell

\[ \text{Repeat FNAC} \]

\[ \text{Same} \quad \xrightarrow{\text{most preferred}} \quad \text{Sx} \]

\[ \text{Malignancy} \quad \text{Malignancy?} \]

\[ \text{Hurlte cell} \]

\[ \text{Sx} \]

↑ RISK OF MALIGNANCY -

1) Male
2) Age > 40y*
3) Children
4) Post Radiation exposure
5) Cold nodules

\[ S_X = \text{HEMITHYROIDECTOMY} > \text{LOBECTOMY} \]
CARCINOMA

GENETICS

RET → Papillary CA.
MET
TRK
BRAF

RAS → Follicular CA.
γ-PPAR.
gsp
p53
mRNAs 197/346

RET → Medullary CA.

↑↑ Ras ↑↑ HMBe-1. ↑↑ Galactin 3 ⇒ Slow malignancy

Useful to differentiate Adenoma vs Carcinoma

FAMILIAL COND.

↓ FAP -
→ AD
→ Chromosome 5q21
→ Papillary Ca of thyroid

27 Werner Syndrome / Adult Progeroid
→ AR
→ WRN gene
COWDEN'S
- AD
- PTEN loss
- Ectodermal GI Polyps (Mott-Smyth)
- Macroccephaly
- Mental retardation
- Thyroid and Breast neoplasms.

- Benign w.r.t colon.

CARNEY'S COMPLEX TYPE I
- AD
- Y-PPAR
  - Atrial Myxoma
  - NAME SYNDROME
    - Nerve and epithelium (freckles)
  - LAMB SYNDROME
    - Blue nevus
    - Atrial Myxoma
  - Not an official name - pseudopapillary nevus

BATMAN
- Breast
- Adrenal
- Thyroid Tx
- Myxoma
- Nevus
McCUNE ALBRIGHT SYNDROME

- AR
- GNAS mutation
- Cafe-au-lait spots
- Osteoclast dysplasia

PAPILLARY CA THYROID

- H/C carcinoma
- Overall
  - Post Radiation

- $\Theta > \Theta$
- 30-50 yrs.
- a/e Lymphatic spread.

FEATURES

1. FLAT on cut section
2. Cuboidal cells
3. ORPHAN ANNIE EYE BODIES, coffee bean nuclei

4. Nuclear crowding
5. Psammoma bodies

These are inclusion bodies.

40% Nuclear crowding

t grooving in of nucleus

57 Psammoma bodies

Calculated thought of dead cell
Other Site Reason for 'PSAMOMMA'.
Meningeoma
Mesothelioma
Serous cyst adenoma ovary
Endometrial Adenoma
Adenoma Lung

Micro/occult Papillary CA -
- Size < 1 cm
- No Lymphatic
- No vascular invasion
- No capsular

Prognostic Factors -
- Age is most imp. factor for DTC (Differentiated Thyroid Cancer)
  - Follicular
  - Papillary

- 2nd M1: Size
For Papillary
1) AGES - Age, Grade, extension, size
2) AMES - Age, Metastasis, Extension, size
3) MACISS - Metastasis, Age, completeness of Sx, Invasiveness, size
**LINSAY TUMOUR**

Well circumscribed
Follicular variant of Papillary Carcinoma

Genetics - ↑ ↑ RAS
        ↑ RAS/PIC
        ↑ ↑ BRAF

MX of PAPILLARY CA

MULTIFOCAL → 85%

Ⅵ TOC - TOTAL THYROIDECTOMY
        [Routine Central Neck Dissec isn't done]

**INDICATIONS FOR CENTRAL NECK DISSEC** (CND)

1) Any Tm > 4 cm size
2) + + LN in central neck

**INDICATIONS FOR △ MRND + CND**

1) LAT (Lateral aberrant thyroid)
2) + + LN in lateral part of neck
FOLLICULAR CARCINOMA

♀ > ♂
40-60 yrs

SOLITARY (papillary - multifocal)
well encapsulated

H/c Type [ In I₂ Deficiency
arising from long standing
multi-nodular goitre

Microscopy - Follicles +nt
But devoid of colloid

Hematogenous spread.

↓
H/c Site = Bones > Lung
osteolytic (Pulsatile mets)

Adenoma can't be differentiated from Ca.
by FNAC

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

MINIMALLY INVASIVE

CARCINOMA

Microscopic Invasion into capsule or
Invasion of small, medium size vessels, lymphatics

PROGNOSTIC FACTORS

1) Age
2) Size
3) Capsular
4) Lympho Invasion
5) Vascular
6) Family H/o
7) Metastasis

Mx of Follicular

TOTAL THYROIDECTOMY

> 4 cm
2-4 cm & High Risk Features
Capsular Invasion
Lymphatic Vascular

WIDELY INVASIVE

Gross capsular invasion or
Invasion of large size vessels lymphatics

HEMI THYROIDECTOMY

< 2 cm
2-4 cm (but any additional risk)
NO NECK DISSECTION NEEDED

HURTHLE CELL NEOPLASM

Variant of Follicular CA.

- Age: 60-75 yrs
- Capsulated + MULTIFOCAL.

Lymphatic + Hematogenous Spread

Microscopy → HURTHLE CELLS seen.

Highly infiltrative

- CT neck/MRI is mandatory for Hurthle cell carcinoma

\[ M_x \]

Hurthle Cell Adenoma → Hurthle cell Carcinoma

- Hemi Thyroidectomy
- Lobectomy

HURTHLE CELL NEOPLASM

ANAPLASTIC CANCER

- Elderly (7th-8th decade)
- <1%
- Rapid, Painful enlargement of long standing goitre

- On Microscopy - Pleomorphic Giant cells
- Spindle cells
- Epitheloid cells
Mx - TOTAL THYROIDECTOMY + CENTRAL NECK DISSECTION

Pre-op CT/MRI is Mandatory

Post-Sx → chemotherapy

> ADRIAMYCIN (DOXORUBICIN)

chemosensitiser: PACLITAXEL / CISPLATIN

In case of local extension
L: [enblock thyroidectomy]

LYMPHOMA

< 0.5%

Non-Hodgkin's Type: → Extranodal → DBCL (Diffuse B cell Lymphoma)

Rx - CHOP

C - cyclophosphamide
H - Doxorubicin
O - vincristine
P - prednisolone

LONG STANDING MNG + Rapid Enlargement

YES

PLUMMER'S

Toxic → NO PAIN

No → ANAPLASTIC CA

FOLLICULAR CA

(any sign of Local Invasion)
POST-OP Mix of DTC after TOTAL THYROIDECTOMY

**INDICATION**

1. Post Total Thyroidectomy
2. Metastasis

**PARAMETERS**

- **Size:**
  - >4 cm
  - 1-4 cm ± High Risk Features

**Capsular Invasion**

- **Lympho**
- **Vascular**

**Lesion:**

- **Solitary**
- **Multiple**

**Preparation**

- Conventional
- Recombinant TSH

**Keep Thyroid**

- **Supplementation AWAY FOR 4-6 wks**
- **AIM**

**TSH Test:**

- ADV Test can be done in 48 hrs
- No waiting for 4-6 wks
- No Risk of Life-threatening Hypo
\[ \text{I}^{123} \text{scan} \rightarrow \text{ve} \quad (\text{<5% considered -ve}) \]

\[ \uparrow + \text{HOT} \]

\[ \text{I}^{131} \text{therapy} \]

**Dose:** 200 mCi \( \rightarrow \) External Dosimetry
1500 - 1000 mCi \( \rightarrow \) Internal Dosimetry

**Thyroid scan:** -ve, Tg \( \uparrow \uparrow \uparrow \)

**Single Dose I\(^{131}\)**

**Case-2**

Persistent Tg elevation

**PET Scan**

also in

[FOLLOW-UP OF HURTHLE CELL.]

**Thyroid Replacement Post. Total Thyroid\(^{131}\) DTC**

(Thyroid Suppression Dose)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Target TSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual Disease</td>
<td>(&lt;0.1 \mu U/dl)</td>
</tr>
<tr>
<td>Disease Free + High Risk</td>
<td>(0.2 - 0.5 \mu U/dl)</td>
</tr>
<tr>
<td>Disease Free (No added Risk)</td>
<td>(0.5 - 2 \mu U/dl)</td>
</tr>
</tbody>
</table>
MEDULLARY THYROID CANCER

H/Lc → Sporadic >> Familial
B/L / multi

↑ CEA
↑ Calcitonin

Lymphatic >> hematogenous

Amyloidosis "CELL BALL"

↑ Histamine → vasomotor feature
↑ ACTH → Cushingoid feature
↑ Serotonin → Diarrhoea

H/Lc distant mets → LIVER >> BONES.
(osteoblastic)

Mx - TOTAL THYROIDECTOMY
+ prophylactic central neck dissec-

INDICATIONS FOR MRND + CND
1) ↑ Central neck node
2) Size > 1.5cm

Remain ONE STEP AHEAD -

TT + CND

TT + CND + MRND (¹) Silarernary

TT + CND + MRND + (B/L)

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
Mx of Adv. MTC (Metastasis)

1) Debulking Thyroidectomy

2) Chemotherapy
   Vandetanib → Doc for metastate MTC
   Labetuzumab (anti-CEA)

3) Radiotherapy

  ➔ No Role of Radioactive Iodine Ablation

For Liver Mets

  ➔ Trans Arterial Chemoembolisation (TACE)

  ➔ TARE → I^{131}, Ytterium^{90}

Radiotherapy

DEBIRI ➔ technique of TACE.
Drug eluting Beads of Trismotecan

CALCITONIN ➔ used for follow up of medullary thyroid cancer.
**PARATHYROID**

**ANATOMY**

Sup. PT 0 0 4-5 somes each.

Inf. PT 0 0 Colour = yellow

Develops from 4th Pharyngeal arch

Sup. PT

Inf. PT

Develops from 3rd Pharyngeal arch

---

1cm

Inf. Thyroid Artery

RLN

Inf. Parathyroid

Sup. Parathyroid

VTDS

ventral Sup.

Inf. Dorsal
**MICROSCOPY**

- OXYPHILL cells
- CHIEF cells
- WATER cells

**PHYSIOLOGY**

**PARATHORMONE** → 84 AA

- 32 AA (rest - non-functional)
- 52 AA (functional)

- **PT**

  - Bound (50%) → Free

  - 90% Albumin
  - 10% Phosphates

  → t\(1/2\) of **PT** → 3 min

  → ↑↑ Blood Calcium Levels

  → Calcium → Albumin

  (↑ every rise or fall above 4gm/ dl of albumin levels)

  → S. Calcium changes by \(0.8 \text{mg/ dl}\)

**Eq.**

\[ \text{Ca}^{++} = \text{8.8 mg/dl} \]

Albumin = 6

\[ \frac{2}{4} \rightarrow 6 \]

\[ 2 \times 0.8 = 1.6 \]

\[ \text{Ca eff} = 8.8 - 1.6 = 7.2 \]
HYPERPARATHYROIDISM

H/c - Adenoma ⇒ Hyperplasia ⇒ Carcinoma
  → in MEN-1 ⇒ Hyperplasia ⇒ Adenoma

Adenoma = enlargement of single PT out of 4
Hyperplasia = enlargement of all PTs.
  If 2 enlarge → double adenoma

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

Types

1°
  ↑↑ PTH produc’ by Ab ∇ gland
  → defective feedback

2°
  ↑↑ PTH produc’ by ∇ gland
  → infant feedback mech. in response
  to chronic hypocalcemia
  eg. CRF
  malabsorp’

3°
  Autonomic activity of gland in response to prolonged stimulation
DIA HUNGRY BONE DISEASE
Rapid, massive absorption of Calcium by the bones after course of Hyperparathyroidism, leading to life-threatening Hypocalcemia.

CALCIPHYLAXIS (Ureemic arteriopathy)
Neutrophilic, granulomatous lesions due to blockage of arteries by deposition of Calcium in anemic state of Uremia.

DIAGNOSIS
1) S. PTH ↑
2) Ca₂⁺ ↑↑
3) [S. Ca²⁺ : PO₄³⁻ > 33].
4) Mild Metabolic acidosis (Hyperchloremic)
5) S. Mg²⁺ → □ or ○ (Osteitis Fibrosa cystica)

H/c of Hypercalcemia ——→ HOSPITALIZATION
OPD ——→ IN HOSPITAL
Admitted
Hyperparathyroidism

FEATURES
Painful Bones
Kidney Stones
Abdominal gowns
Psychic Hoars.
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 resorption of Radial
   Aspect of middle phalanx of 2/3rd finger
   2) Tufting of distal phalanges
   3) Salt & pepper skull
4) Osteonecrosis of Jaw (Brown Tumours of Jaw)\textsuperscript{157}

**GIT**
1) Dyspepsia
2) Ulcers
3) Ac. Pancreatitis
   \[\text{Calcium > 12.5 mg/dL}\]

**Neurological Symptoms**
- Depression
- Anxiety

**Others**
- Myopathy → proximal or purely muscular weakness

**Rx**

**Localization of Para-Thyroid**

\[\text{INVASIVE} \quad \text{FNAC} \quad \text{Arterial Sampling}\]

\[\text{NON-INVASIVE} \quad \text{(Preferred)}\]

\[\text{SESTAMIBI Scan (Best)} \quad \text{(DUAL SCAN)}\]

\[\text{Tech}^{99} \quad \text{SPECT}\]

\[\text{Ioc for ectopic parathyroids}\]

\[\text{Para-pharyngeal}\]

\[\text{Mediastinal}\]

\[\text{Intrathymp}\]

\[\text{Intracarotid}\]

\[\text{Carotid Sheath}\]
4D-CT → 4th Dimension for functional assessment check vascular gradient

USG → IOC for Intrathyroidal PT’s

Rx-

**INDICATION FOR Sx**

1. All Symptomatic HPT
2. or
   Asymptomatic Patient & any of the following
   a. Age < 55 yrs
   b. Nephrolithiasis
   c. GFR < 60 mL/min → Grade III CRF
   d. Serum Calcium > 1 mg/dL above baseline
   e. Z score < -2.5D

**Sx**

**ADENOMA**
4 gland exploration
F/θ Resec’t of Ag gland

**HYPERPLASIA**
Either
- Partial Parathyroidectomy
- 3½ gland Sx

**CARCINOMA**
Removal of gland + adjacent tissue + Ipsilateral Neck Dissection.

**CARCINOID**
Resection of most Ag gland

**PARATHYROIDECTOMY**
Minimal Invasive Parathyroidectomy is done via 2cm incision
Total Parathyroidectomy
F1B 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

\[ \text{POST-} S_x \]

\[ \begin{align*}
\text{PERSISTENT HPT} \\
\text{Elevated Ca} \\
\text{Elevated s. calcium} \\
\text{after 5x} \\
\text{after 5x a phase of 6 months of } \\
\text{N calcemia}
\end{align*} \]

\[ \begin{align*}
\text{RECURRENT HPT} \\
\text{Intra-operative PT assay} \\
\text{Confirmatory PT test for PTs} \\
\text{Fall in PTH level >50% after 30 min of removal of Ab} \\
\text{N gland}
\end{align*} \]
HYPOCALCEMIA

6. Calcium < 8.5 mg/dl

FEATURES

1) Hallucin - Hyper Tengling or perioral numbness
2) Tachy Cardia | Palpitation | arrhythmia
3) Chvostek Sign
   Twitch @ facial Hs on tapping over zygomatic arch
4) Trousseau’s Sign (Most sp)
   Carpo pedal spasm

Hx-

<6.5 mg → 7.8 mg/dl → Oral Calcium

(1 gm × QID)

+ Vit D / Hydrocortisol

Ca²⁺ < 7.8 mg/dl → I.V. Calcium gluconate
ADRENALS

PHEOCROMOCYTOMA

Tumor arising from chromaffin cells of Adrenal medulla (derived from neural crest cells)
also known as 10% TUMOUR

10% Familial
10% Bil
10% - Malignant - Any Pheo is metastasis
10% - Extradrenal

Non-specific - (seen in benign also)

Pleomorphism
↑↑ Mitotic count
Atypical cells

HIGH PASS Score → Pheo in adrenal severity score
↑↑ Ki67
↑↑ Index of neurosis

PARAGANGLIOMA - Extra-adrenal Pheo

H/e Site = Organ of Zuckerkandl.

H/e Location
→ C to bifurcation of Aorta

→ Sporadic ↔ familial

H/e
5th - 6th Decade
Familial → a/c MEN2
  VHL
  NF1

→ GENETIC - Mut* in SDH (succinate dehydrogenase)

B → D
↓
Pheo → Paraganglioma

Noradrenergic → 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

Paraganglioma
Paraganglioma
Pulmonary chondroma

CD 117 (−)
PdGF (−)
BRAF (++)
Ins like Gf (++)
CARNEY'S STRATIKIS SYNDROME

GIST + Paraganglioma.

C/F - P = Palpitation.

\[ \begin{align*}
D & \quad \text{Diaphoresis} \\
H & \quad \text{Headache (70\%)} \\
\text{Episodic HTN (90\%)}
\end{align*} \]

Analysis:
10c = Urine 24hrs Free METANEPHRINE.

1st Line Inv - Plasma free metanephrine
Rule out Pheo

Plasma Free Metanephrine

24 Hr. Free Urine Metanephrine

Repeat 24 Hr.

Pheo Urine free

Ruled out Metanephrine

EQUIVALENT

CLONIDINE SUPPRESSION TEST

Pheo ruled out

Δsis confirmed

LOCALISATION

Iodine MRI > ECT

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

DOPA PET

Suspecting multifocal lesion

<50 yr or Solitary

HIBG Scan

(Metiodo Bencil guanidine)
PR-OPERATIVE CONDITIONING

α Blockers → Phenoxybenzamine (2 weeks prior to Sx)
1st sign of Blockade → Nasal congestion.
other → Orthostatic Hypotension.

↓

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

↓

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

\[\text{α-agonist may be added to prevent hypotension}\]

In ♂ ⇒ Termination of ♀

↓

Lap Adrenalectomy Sx
ADRENAL INCIDENTAL TUMOR

- Accidentally detected while screening for other pathology
- 70% - non-functional
- 30% - functional (Aldosteronoma - H/1)

NON-FUNCTIONAL

↓

SIZE

↓

<3 cm
(↑↑ risk of malign)
↓
Observe 6 monthly
CT/MRI

↓

3-5 cm
Age < 55 y
?
Malignancy
Pt. fit for sx
If Tx shows Internal Growth

② ← ④

On CT → HF

>10 HF
↑↑ Malignancy
Observe

<10 HF
ADRENOCORTICAL CARCINOMA

- Rare
- $\varphi:0^+$ (1:5:1)
- Bimodal Age - 1st $\rightarrow$ 1st Decade
  $2^{nd}$ $\rightarrow$ 5th $-$ 6th Decade.
- Hostly $\rightarrow$ Acc [Functional]

\[ \text{H/c: Aldosteroneoma} \rightarrow \text{Cushings} \]

Features S/o Malignancy

1. WEISS INDEX
   - Size $\geq 7.5 \text{cm}$
   - Atypical cells
   - Pleomorphism
   - High mitotic count

WHO CLASSIFICATION

I. $< 5 \text{cm size}$
II. $7.5 \text{cm}$
III. Any size $\&$ Local Invasion
IV. Disseminated

Rx - Radical Resec$^*$ of Adrenal
**MEN SYNDROME**

**[Multiple Endocrine Neoplasia]**

- **MEN**<sub>1</sub> WERMER SYND.
- **MEN**<sub>2</sub> SIPPLE Synd.

**MENIN** \(\leftarrow\) **GENE** \(\rightarrow\) RET protooncogene

(Rearrangement during transfection)

**On** 11q13 \([110\) codons\])

AD \([610\) axons\])

**JUN-D protooncogene mut**\(^+\)

**gDNF**

glial derived neurotrophic factor

**MEN-1**

- **Parathyroids** (80%)
- **Pancreas** (60-70%) \(\rightarrow\) **Pituitary** (40-50%)

**PARATHYROID**

H/c Site for MEN1

H/c ab\(^+\) \(\rightarrow\) Hyperparathyroidism

\(\downarrow\)

H/c

Hyperplasia \(\rightarrow\) Adenoma

H/c Biochemical Ab\(^+\) \(\rightarrow\) Hypercalcemia

1st age - 13-15 yrs.
**PANCREAS** - Neuro-endocrine Tumours

- Functional >> Non functional
  - Gastrinoma >> Insuloma >> Polypeptideoma
  - M/c func. Mic NETx
  - Tx Overall

Other → VIPoma (vasoactive intestinal Peptidoma)

  - WDHA Syndrome / Verner Mollison Synd.
  - Watery Diarrhoea
  - Hypokalemia
  - Achlorhydria

**PITUITARY**

Post- Pituitary is never involved
only Ant. Pituitary involved.

M/c lesion = PROLACTINOMA

- O → amenorrhea
- O → infertility
- f → galactorrhoa

Blindness may be seen due to compression over optic chiasm.
Other Tx of MEN-1

1. Bronchial / Thymic / Gastric Carcinoid.

**CARCINOID** → [Get M/C]

Appendix → Ileum → Rectum → Bronchus

2. Lipoma
3. Cutaneous + Facial Angiofibromas
4. Thyroid Tumours
5. Adrenal Mass

ΔSir of MEN1

CRITERIA: Involvement of 2 out of 3 target endocrine organs.

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

SCREENING

→ At Birth: MENIN GENE MUT.

↑ MEN1 ruled out

At 5yr.

MRI $$\leftarrow$$ Pituitary @
Annual sr. Prolactin.

↓

Sesta mibi $$\leftarrow$$ At Byr @ Parathyroid Scan @ Annual sr. PTH/Ca²⁺
At 20yr @ Pancreas

* annual su

Gastrinoma

Evaluate 1. Insulinoma - c. peptide
that

Glucagon

VIPoma

Chromogranin A \( \rightarrow \) NF Tumour

Synaptophysin

A. Gastrinoma →

BAO → >15 mEq/hour

or

> 5 mEq/hr

(in post vagotomy status)

↑ Fasting Gastrin

(>1000 pg/mL → Asc)

100 - 1000 pg/mL → equivocal)

↓

Secretin Stimulation Test

↑

Rise > 200 pg above Baseline. Asstic

Insulinoma - I0G = 72hr monitored fasting

11 c-peptide >1.2 mg/dL glucose

Insulin >12 μIU/mL

<50 mg/dL \( \rightarrow \) 0'

<40mg/dL \( \rightarrow \) 0
Pro-Insulin > 40%
Ans: glucose > 3

**MEN-2**

- **MEN2A**
- **MEN2B**

More aggressive

H/c site → MTC

Interscapular

Regional

> Cut. Lichen (deposition of

Plexus Amyloidosis Amyloid in

Papillary Dermat

Hyperparathyroidism

Hirschsprung's Disease

No fecal soiling

Mucosal neuroma

M/c → Lips, Buccal cavity

GI neuroglione

Marfanoid Habitus

Everted eyebrows

Megaldon

Chronic constipation

Fecal soiling

Tongue nodules

SCREENING

At birth → RET Mutn

+ MEN2 ruled out

Pentagastrin

stimulated calcitonin

Level

Elevated → Prophylactic Total Thyroidectomy
\[ \text{MEN}_{2B} \rightarrow 7 \text{ in 1 year} \]

\[ \text{MEN}_{2A} \rightarrow \leq 5-6 \text{ year} \]

\( \text{No L.N. Dissection} \)
SALIVARY GLAND

TUMOURS

BENIGN

1) PLEOMORPHIC ADENOMA (PLA)
   1/c Overall salivary gland tumour
   1/c Tumour of Parotid Gland
   1/c Benign Tumour overall

PLA = epithelial cell
     Mesenchymal cell → Pleomorphic
     Duct cell

♀ >> ♂ [3:1]

* PAROTID PLEOMORPHIC ADENOMA =
  1/c Site = Superficial Lobe Lower Pole
             (Tail)

DUMBLE Tx → when both lobes involved
             (Sup & Deep)

Medical Displacement of Tonsillar Pillar

\[ \text{Diagram:} \]
FEATURES:
- Encapsulated
- Firm
- Mobility
  - "freely mobile except in upward direc'
  - CURTAIN SIGN
(due to insertion of deep cervical fascia
  into zygomatic arch)

SIGNS OF MALIGNANCY
- Facial N/V weakness
- Ulceration
- Fixity
- Rapid rise in size
  onset Pain.

CARCINOMA EX- PLEOMORPHIC ADENOMA
Malignant conversion of long standing PLA

PLEOMORPHIC AD- CARCINOMATOSIS
100% Carcinomatosis conversion
& no adenoma component
Asis:

**PAROTID MASS**

**I.o.c.** = FNAC

- 100% accurate
- 95% specific
- 90% sensitive

**Biopsy & C/I**

Due to Rule by

1) From Fetal NV Injury
2) Tumour Spillage
3) Parotid Fistula

Tumour for malignancy → MUC1; DF3

For Malignancy? → MRI > CT

To evaluate gland + its relation

**PAROTID MASS**

- **BENIGN**
  - Deep Lobe
    - Total conservative Parotidectomy
    - (Parotid + Pre-Auricular LN + Involved part of Facial NV)
  - Supra-Facial Parotidectomy

- **MALIGNANT**
  - Radical Parotidectomy
Recurrent PLA → Sx → RT 99%

**FACIAL N/V RECONSTRUC**

Swal N/V (BEST)

Other - Auricular Temporal N/V
Anti - Lubital Branchial N/V

Sup. Parotidectomy →
Removal of Sup. Lobe of Parotid to expose
Branches of Facial N/V.

Supra fac. Parotidectomy -
Wide local excision of Benign sup. Lobe Tx
to expose branches of Facial N/V branches
Adv - Less Inj to Facial N/V.

![Diagram of facial nerve and vessels](image)

Fascial N/V
(Ant/above the Plane)

Ext. carotid A.
(Below)

Fascio-venous plane of
Retro mandibular
Patey
Vein (Through)
WARThIN'S TUMOUR

2nd H/c Salivary Gland Tumour.

Exclusive to Parotid

K/n as ADENOLYMPHOMA → monoemer

K/m as PAPILLARY CYSTADENOLYMPHOMATOSIS

$\alpha^2 \cdot \gamma^q (4:1)$

Can be B/L (10%)

Strongly a/e Smoking

Radiation

↑ in Mitochondria

Tech

HOT SPOT

H/c Site → TAIL of parotid

Microscopy - 2 rows of papillae lined columnar epithelium.

37 ONCOCYTOMA (<1%)

K/n = OXYPHILIC ADENOMA

Tan or Mahogany colour

pseudo capsule
4) LYMPHOEPITHELIAL LESIONS

a) CMV Injec
k/n as GODWIN'S TUMOUR
Mostly Benign
ass/é → BLEL → Benign Lymphoepithelial lesion.
Gland Parenchyma → Replaced by Lymphocytes.
<5% → malignant
ESKIMOMAS

MALIGNANT

1) MUCOEPIDERMOID CARCINOMA
→ H/c malignancy → overall
[ Parotid → Infant
→ a/é radiation

Parotid → H/c site
Tech.99 → HOT SPOT
(overall → kidney → H/c site → oncocytoma)
H/c Benign Tx
MEC

Low Grade    Int. Grade    High Grade
Encapsulated Clear Cells    Non-encapsulated Cell
Mucous Cells
Epidermoid Cell
↑↑ mitotic count
↑↑ infiltration

Rx = Radical Resection [Hb. RT
[except Low grade muc.epidermoid]

Mu Co Epidermoid    Infancy
↓↓↓↓↓↓↓↓↓↓↓↓
Low Int High

27 ADENOID CYSTIC TUMOUR

Low grade
Slow growing
a/ e → Perineural Invasion
\ Hematogenous Spread.
also known as CYLINDROMATOUS TUMOUR

ACT

SOLID

PAPILLARY

CRIBRIFORM

H/c malignancy → Submandibular gland
Sublingual
Menoe Salivary
On Microscopy → Swiss Cheese

Rx - Radical Resection

37 Acinic Cell Tumour

- Low grade Tumour
- Slow growing
- Tum of pure Serous Gland

90% Parotid

- A/o Lymphatic spread

Microscopically Type is H/c

Other types → Papillary, Follicular, Medullary

Microscopy → Zymogen Granules

Bubbly Basophils

Rx - Radical Gland Resection
**OESOPHAGUS**

- Length of oesophagus - 25 cm
- * 3 f of contractions from incisor
  - 15 cm - Cardiac oesophagus
  - 25 cm - Oesophagus T1 - T4 (Bronchus)
  - 40 cm - Diaphragm T10

- Cricopharynx is narrowest part of whole of GIT. Next narrowest part is ileocecal valve.

- T11 - GEJ

- Opening of Diaphragm -
  - T6 - T10 - Phrenic nerve
  - T10 - Oesophagus - Branches of 2 gastric artery
  - T10 - Aorta - Azygos vein - Thoracic duct
  - Azygos vein - Drain into Brachiocephalic vein

<table>
<thead>
<tr>
<th>Blood Supply of Oesophagus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic duct</td>
</tr>
<tr>
<td>Infrathyroid artery</td>
</tr>
<tr>
<td>Intercostal trunk</td>
</tr>
<tr>
<td>T10</td>
</tr>
</tbody>
</table>

- Lung - Aorta - Azygos vein - Thoric vein - Portal vein - Azygos vein
It has no serosa. Hence there is no subserosal plexus.

They have submucosal plexus.

1. Organ of URT has no submucosa \( \rightarrow \) GI B.

2. Longitudinal muscle \( \rightarrow \) Helicoidal pattern

   1. Diffuse oesophageal spasm (DES)
      - Long, scroll appearance in Barium swallow

   2. Distensibility \( \rightarrow \) good pot of stretching
      - Dysphagia as a symptom occurs when there is obstruction \( \geq 75\% \)

   Hence, Ca solid plaque has late presentation

   Poor prognosis

   5-year survival rate < 20%

Epithelium:

- Non-keratinised stratified \( \rightarrow \) Epithelium

- Upper middle \( \rightarrow \) EG. cell ca

Adenocarcinoma \( \rightarrow \) Z line \( \rightarrow \) Cuboidal initially \( \rightarrow \) Late, Columnar

Risk: 40-50%

(Pre-malignant)

Barrett’s oesophagus \( \rightarrow \) Intestinal metaplasia (Intestinal columnar)
Commonest CA of Oesophagus → Sq. Cell CA.  
    Site → Middle 3rd

Adeno CA → Lower 3rd  
    Common in White O→

A long segment of Barrett's → >3cm Squamous

A. What dye is used for Barrett's → Iodine
    Chromoendoscopy  
    Earliest Dx for oesophageal CA.

for columnar → Methylene Blue
    Air-geared cavity → 3 Indigo Blue

For Histology, Alcian Blue, Alcian Blue @ Metallion Yellow

Due to Foreign Body in Oesophagus

  Symmetrical  
    - sharp  
    - magnet, button batteries
  Asymmetrical
    - smooth F.B.
    - wait for 24 hr & relet
  Immediate removal by X-Ray
  Endoscopy
Zenker's Diverticulum

- Pulmonary diverticula from Killian's Dehiscence
- Acquired Dehiscence

- Common in 
  - old age
  - Pressure
  - Ach
  - Premature
  - VIP
  - Nitric oxide

Congenital
- Tube
- All 5 layers

Acquired
- Hole
- Only 1 layer

01 | Pulmonary diverticula.
    | Thoracic diverticula
  | \( \Rightarrow \)
  | Zenker's (Pulion)

Killian's Dehiscence is posteriorly (hypopharynx)

Diverticula is common in (2)
  - (Pulion)
2nd swallowing found in Ba meal studies in Zenker's diverticula.

GE -
1. Regurgitation (old/undigested)
2. Dysphagia (intermittent)

M/e of Intermittent Dysphagia ⇒ DES
Other cause (1) Achalasia: Ring
(2) Zenker's
(3) Eosinophilic esophagitis

3. Halitosis
4. Aspiration pneumonia (M/c complication)
5. Lung abscess most common
6. Ca oesophagus 5% M/c

Maerten Classification. Von Overbeek
< 2 cm ⇒ compare to vertebra
2-4 cm
> 4 cm.
< 1 vertebra
1-2 ""
> 3 ""

I2OC ⇒ Barium Swallow

M/e site of intracardiac perforation ⇒ Cervical oesophagus

* Indications for Ba swallow:
1. Complete dysphagia
2. Liquid dysphagia
3. Anatomical delineation
4. Diverticulum
5. Gastric hiatus hernia
6. Volvulus
Rx.

> 4 cm ⇒ Diverticulectomy

+ Cricopharyngomyotomy

(Cervical myotomy)

If ZD ≤ 2 cm ⇒ Cricopharyngomyotomy or
Botulinum toxin injection

⇒ Release of Ach

2-4 cm ⇒ Myotomy & Bot. toxin injection

+ Diverticulopexy

Dohlmann's Procedure
- Endoscopic procedure

- Stapler used

-not good for very small diverticula

These days CO2 lasers are used

Any size can be done

Von overbeck done it 1st

Montreal

If dysphagia ⇒ candidias orบรรทุก ลอฟมาร์แก่งให้
fill induced esophagus
OESOPHAGEAL WEB & RINGS

* Plummer Vinson Syndrome / Paterson Brown Kelly Syndrome
  - Asymmetrical mucosal web
  - Seen at the level of cricopharynx (Post-cricoid)
  - Mid-aged / Perimenopausal / Edentulous &
  - Associated with Fe Deficiency Anemia
    - Asymptomatic, rarely may cause Dysphagia
    - Sideropenic Dysphagia
  - Cancer ring
    - Tx O - Barium Swallow
  - Rx (1) Asymptomatic - Fe supplementation
    - Symptomatic
      - Balloon Dilatation
      - Savary Dilator - Huphure web
      - CO₂ Inflation

* Rings - Schatzki Ring / B Ring
  - Symmetrical
  - Submucosal fibrous thickening
    - At Z line, above diaphragm
      - Seen along with sliding hiatus hernia
  - Non-progressive Ring
    - Happens due to GERD
  - Asymptomatic
    - Pt will never have dysphagia for liquids
- Only dysphagia for solid. (moderate)
- Sudden aphagia

_ixo_ \rightarrow \text{Barium Swallow}

Rx - Asymptomatic - t+t reflux.

Symptomatic -
- Balloon Dilatation \& rupture the ring
- Hiatus Hernia \& Fundoplication

Q: True statements re: Schatzki's ring

1. _Dysphagia_ predominantly to solids
2. _Symmetrical_
3. Rule of GERD
4. Tissue muscle \rightarrow \text{No. submucosal}

**Spontaneous Rupture / Boerhaave's Syndrome**

- Caused by Barotrauma

It is spontaneous rupture of ○ lower oesophagus (97%)
- due to vomiting/retching against closed glottis
- Pleural effusion.
Meckle's Triad ⇒
1. Vomiting/Hematemesis
2. Retropertitoneal bleed
3. Surgical Emphysema (also in subcutaneous plane)

Hamman's Sign ⇒
- Sign of pneumomediastinum
- Accidental finding

Air Crunch or Heard Beat

Ioxo → X-Ray → CECT ⇒ Most accurate

Don't prefer Barium in case of perforation as Bara is water insoluble

- Lateral Position is best for visualization

Gastrografin ⇒ Water soluble but Hyperviscous

Plain X-Ray ⇒ Deline shadow btw (B) diaphragm & continuous diaphragm sign

- Neeler's - V sign

- Sail sign or Spinnaker sign

- Parenchymal fiber

- Yen-Kyo Leaf Sign

been in surgical emphysema
Rx - Post lateral (L) thoracotomy & 1st closure

1st closure = Vicryl

< 48 hr ⇒ 1st closure

> 48 hr ⇒ 24 hr ⇒ No 1st closure

Thoracotomy ⇒ ligate above & below the tear

- Drainage
- Feeding jejunostomy
- Cervical oesophagostomy ⇒ for suction aspiration

Discharge after recovery

After 3–6 months

Excise the diseased part

Bowel Interposition (Jejunum > colon L)

Mallory Weis Tear

- Barotrauma
- Longitudinal tear

Below AEJ (70%)

- Commonly seen ⇔

3 Alcohol Binge
3 Hiatus Hernia
- Partial thickness tear (Mucosa, submucosa involved)
  H/o - vomiting initially → Haematemesis.

  lxo c → Endoscopy

  Rx - o conservative
    o Sx - sclerotherapy

  Q C artery bleed in Mallory-Weiss Tear?
  Q gastric artery

  TRACHEO-OESOPHAGEAL FISTULA

  (A) 5-10%
  (B) M/c type
  (C) ≥ 80%
  (D) Green
  (E/H)

  Q Continuous dribbling of saliva

  Type (A) + (B) → kaphoid abdomen a air after intake

  Q Choking while feeding
YOGI → O → 36.

- Incidence: 1:5000
- Q² > q
- Common in Down's Syndrome

- Congenital malformation
  - Polyhydramnios (50%)
  - GIT abnormality → Poly
    - Renal is → oligo.
  - 50% → multiple congenital anomalies VACTERL
    - V → vertebral
    - 2nd H/c → A → anorectal
    - H/c → C → cardiac - VSD, PDA, TOF
    - T → TEF
    - E → renal
    - L → limb → Radial Hypoplasia
  - Relative YI to BMV

TXUC:
- N/A tube → take X-Ray
  - Caudal end of tube in upper oesophagus (1cm)
  - If tube & lung → proximal fistula

Shelley 2012
- H type fistula → Most accurate in
  - Tracheobronchoscopy

Safest contrast for tear → Diaseal
  - Water soluble
  - Low osmolality
Rx. 1. O2 I.V. fluid, Antibiotics

1. Feeding gastro-stomy for sick babies.
2. Posterior thoracotomy (for middle oesophagus)
   ligation of future & the oesophageal
   anastomosis (tend to side anastomosis)
   ↓ risk of structure

Waterston's Criteria:
1. Birth wt ≥ 5.5 lb
2. aspiration pneumonia -ve
3. Thoracotomy I.V. fluid feeding
   make note gastrostomy

Primary Achalasia Cardia

- Improper Relaxation of LES
  - Submucosal → mesenteries
  - Muscles → Auerbach's or myenteric
    (Motor ganglion)

Cause:
- absence of ganglion - inhibitory ganglion

2. Achalasia → Chagas' Disease (Trypomastigom Crusi)
   Common in S. America

Pseudoachalasia → by cancer
- young age (20-40yrs)
  - GERD
- CF - O) Dysphagia - for liquids & solids
  - progressive
- Both for liquids & solids
  - Non-progressive

2. Regurgitation
   - Aspiration
   - halitosis
   - wt. loss.

3. Cancer => Sq. cell carcinoma

Yield => 1) Dysphagia
       2) Regurgitation
       3) wt. loss

* Triple A syndrome / Alagrovic Syndrome -
  A - Achalasia
  A - anemia
  A - ACTH \& adrenocortical insufficiency

FACET => 3W
1. Plain x-ray
   - Absence of fundal gas shadow
   - Widened mediastinum
   - Air-fluid level in mediastinum

   - Non-relaxation of LES

B. ↑ pressure of LES
Amyl nitrate inhalation test is used to detect Achalasia Cardia

- Non-Atonic Oesophagus or high pressure non-propagatory

3. Barium swallow - Bird Beak appearance
   - Rat tail deformity
   - Oesophageal Cancer
     - Irregular margin
     - Tendo defect

Rx - Medical Rx - 10% efficacy - CCB Nitrate

Highest resistance

3. Injection of Botulinum Toxin → recurrence rate > 50% in 6 months

3. Balloon Dilatation
   - 45F - 60F
   - 48F
   - 5Fr = 1 mm
   - Outer diameter
   - 5% risk of perforation of tube

4. Heller's Myotomy
   - By laparotomy or laparoscopy

So, comp. → GERD

Collar Sling - prevent GERD

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

**NUTCRACKER** _Oesophagus_ / **SUPERSQUEEZER**

- Middle aged
- 90% - O Retrosternal pain

H/I: motility disorder of oesophagus

H/I: " " present in Dysphagia

I/n - Manometry

O’ Castell criteria
- Pressure > 180 mmHg
- Duration of wave > 6s

70% nutcracker oesophagus

Rx - Medical Rx → MCCB

@ Nitrate
GERD - MAJOR TOPIC

Pathophysiology:
- pH of stomach - 1-3.
- pH of esophagus - 5-7.
- If pH of esophagus < 4 ⇒ Pathological.

* Protective Factor

1. LES:
   - Pressure - 20 ± 5 mmHg.
   - Physiological sphincter

2. Intra-abdominal length
   - Should be > 2-2.5 cm
   - If < 1 cm ⇒ reflux occurs

3. Intra-abdominal pressure
   - ↑ Sphincter pressure

4. Supine position: ↑ Sphincter pressure

5. TLESR (Transient LES relaxation)
   - More frequent

LES ↑ by
- 1. Protec. diet
- 2. Gastrin
- 3. Ach
- 4. Sezen
- 5. PUF
- 6. β-Stimulation

LES ↓ by
- 1. Fat
- 2. Alcohol
- 3. Smoking
- 4. β-Blocker
- 5. Somatostatin
- 6. CCB, Nitrate
- 7. Atropine
- 8. Theophylline
- 9. Morphine
- 10. Diazenide
Low Intragastric Pressure
- Reflux ↑

2° Peristalsis -
- Starts from cricopharyngeal
- Results from Reflux + Propagatory
- 1° Peristalsis - in response to swallowing
  propagatory

- 2° Peristalsis - non-propagatory

Preby aerophagia - motility disorder
- 3° Peristalsis - seen in old age

T° Angle between - UGI
- If < become 90° reflux occurs

IV Muscular folds at UGI. (Gastric rosette)

V WCrue of Diaphragm. Pinch.
- Crew prevents reflux cock effect

Allison Repair → tightening of Crew of Diaphragm

Btw Crew of Diaphragm, → Medical arcuate lig.
- Present at T12
- Below it: Celiac trunk
When medicalocreate big jaw below it comprene.

Coeliac trunk → Medical Aneurism Syndrome.

CF:
1. Heart Burn / Epigastric pain
2. Water Brash

If laryngeal spill over → Aspiration Complex
   - Vocal cord nodule
   - Reflux
   - Dental caries
   - CSOM

M/c presentation in child → Aspiration.

Other Comp of reflux:
1. Ulcer → Bleed
2. Structure → Dysphagia
3. Barrett's esophagus → Lung Cancer
4. Schatzki Ring

Gnv
1. Ba swallow → Deep ulcer
2. Stricture
3. Hiatal hernia

2. Manometry → TLEER
3. 2° peristalsis

4. 1st erv → Endoscopy → very helpful
5. Gold Std → 24 hr pH monitoring
Where exactly pH is measured > 5 cm above GEJ.

De Meester Criteria - 6 parameters for diagnosing GERD

when score > 14.72 => 5/0 GERD.

Bernstein test → obsolete now.

Rx -
1. Lifestyle modification
2. H. obesity
3. H. blockers + PPI + Prokinetics

HIATAL HERNIA

Types
1. Sliding Hiatal hernia/axial
2. Phrenocostal lig.

M/C - 70%

- No tear in ligament (phrenocostal lig)
- Peritoneum covers only 1/4 side.
2. Rolling Hiatus Hernia/Para-oesophageal
   - ligament is torn
   - complete fundus is covered by peritoneum
   - Fundus goes up
     - CAMELBOLE ulcers can.

3. Mixed - Both - most complications.

4. Other Bowel parts herniate

   a. sliding herniae = 
      - reflux GERD

b. rolling herniae = 
   - pain/dysphagia
     - Neurotic, ischemic more common

Ref. - Ixoc = Barium Swallow in Trendelenburg position

- Plain X-ray = Retrocardiac air-fluid level
  - fundal gas shadow

Sym. - Nissen's Fundoplication - 360°
Length wrapped → 3-4 cm
Wrap should be loose = Floppy wrap
Hi c compens of fundoplication = Gas Bellat Syndrome
Earlier time = Pneumothorax

2. Belsey
270° wrap
done by thoracotomy

3. Toupet
<270° part. wrap

4. Doe
<270° ant. wrap

5. Watson
180° ant.
Allison Repair, approximate edge of Diaphragm.
Hill's Repair, stitch edge of stomach to lower esophagus posteriorly to median arcuate ligament.

Collis & Gastroplasty = done for short esophagus
Wring of flap of stomach
lengthening of esophagus done
OESOPHAGEAL CARCINOMA (pH)

- Old age
- M/E site → Middle 1/3rd
- M/E type → Squamous Cell Carcinoma
- St: Q = 2:3:1
- Adenocarcinoma common in lower 1/3rd
- In white Q
- ATMS

Risk Factors:
1. Diet
   - Vitamin Deficiency
     - Hot Beverages
     - Smoked fish
     - Nitrosamine compounds
     - Smoking & alcohol
     - Vitamin A Deficiency
     - Calcium +
     - Molybdenum
2. Zetker's Diverticulum
3. Plummer-Vinson Syndrome
4. Athalasia Cardia
5. H. pylori → CAG-A
6. HPV 16, 18, 31, 33
7. Tylosis → AD inheritance
   - Chr. 17
   - Howel-Evans Syndrome
   - Palmo-plantar Hyperkeratosis
8. Alkaline structure
   - Cautie → NaOH (lye)
9. Geotrichum candidae
Adenocarcinoma:
R/F
1. Barrett’s Oesophagus
2. Obesity (↑ fat)
3. Scleroderma → calcium reflux → H. Pylori (Protective)
4. Ps

Presentation:
Gen symptoms:
1. Flatulent
2. Loss of appetite
3. Cachexia

Metastasis:
Nodal > Blood

Local:
- Dysphagia
  - Late features
    - 75% lumen blocked
    - Hard, fixed
    - Progression
    - Short duration

Para-aortic Syndrome:
Hypercalcemia

Investigation:
1. 1st/Best → Endoscopy + Biopsy
   Earliest Diagnosis

2. Stage T N M
   PET-CT → for metastasis
   CECT
   N > M > T
For $T \Rightarrow$ depth $\Rightarrow$ Endoscopic USG (15-17 MHz)

Node $\Rightarrow$ Biopsy.
Higher frequency $\Rightarrow$ less depth $\Rightarrow$ high resolution.
Low $\Rightarrow$ less more penetration.

For $M \Rightarrow 18$ FDG PET Scan.

$\frac{1}{2} t \Rightarrow 110$ min.

Ba. swallow

Apted lung

L (L) Colon.

Rx

SCC $\Rightarrow$ Radio (S)

Chemo (S)

Cervical oesophageal Ca $\Rightarrow$ can be Rx by RT $\pm$ CT

Thoracic $\Rightarrow$ RT $\Rightarrow$ can affect CO, Lung.

Hence, surgery is imp.

Neoadjuvant $\Rightarrow$ Before sx;

$\Rightarrow$ to $\Rightarrow$ the size of tumour, $\Rightarrow$ make CT operable.

Adjuvant $\Rightarrow$ after sx

$\Rightarrow$ to prevent recurrence.

CT $\Rightarrow$ Ciploxin $\Rightarrow$ Doc + 5 FU.

$\Rightarrow$ ATN (nephrotoxic)

Initially hydrate the pt. $\Rightarrow$ give ciprofloxin

Infect $\Rightarrow$ given along w/ monitored.
- vomiting
- ototoxic

Sx - 1. Ivor-Lewis Oesophagectomy (for lower, middle oesophagus)
   2 step process

1st Laprotomy -> for mobilising stomach

Thoracotomy -> for removing T

Remove Cancer -> gastric pull up -> Gastro-anastomosis in thorax.

H/e cause of mortality -> Leak

Safe Margin for oesophagus -> 10 cm
due to oesophageal lymphatics
Best substitute for oesophagus -> stomach.

2. Total Oesophagectomy / McKeown Oesophagectomy
   -> Laprotomy -> 2. thoracotomy -> Neck
     (In Black Oesophagectomy)

3. Trans-Hiatal Oesophagectomy / ORRINGER
   (for lower, middle oesophagus)
   Laprotomy -> Neck incision
   No thoracotomy -> No lung complication.
Flap is based on:

- Left curvature
- Greater curvature
- Gastroduodenal artery
- Gastroepiploic artery

Palliation → To improve quality of life
Relief for Dysphagia

- Stent - endoprosthesis
  - MR tube → oblique
  - SEMS - Self Expanding Metallic Stents
    - Less chance of perforation
      - Made up of Nickel-Titanium alloy
      - So called Nitinol alloy

Complex → O Blockage

Now, coated SEMS are made - PTFE

- SEPS
  - They are smooth, hence they
  - Intraluminal comp.

- RT
- Laser
- Photodynamic Therapy

Feeding Gastrostomy → Not done being key
  - Jejunostomy Don't improve quality of life

- Drugs

- Malignant TEF → R-stents
  - or Surgical Bypass
Barrett's oesophagus - Medical Rx
- yearly endoscopy for 2-3 mths

Mild Dysplasia

High grade Dysplasia

Oesophagectomy

Excise Mucosa
by Laser PDT
Submucosal Reexcision

Best = Radiofrequency Ablation

Menetrier's Disease

Hyperplastic Protein Losing Gastroptathy

- Mainly involves proximal part of stomach
- Mucosa become thick
- Giant rugal folds
- Deep ulcers
- Foregut hyperplasia \( \rightarrow \) Mucous producing

- Cell chief \( \rightarrow \) parietal cell \( \rightarrow \) Mucous cell

\( \uparrow \) produce mucous containing protein.

\( \uparrow \) TGF \( \rightarrow \) \( \uparrow \) Cancer risk
Adult - associated with H. pylori

Dx → Endoscopy → Biopsy → CECT

Rx:

- Octreotide
- PPI
- In severe cases → Gastrectomy
- Cetoxemab → Colon cancer, wedge resection

TRICHBEZOAR → Hair ball in stomach

RAPUNZEL SYNDROME, young female

Phytobezoar → Veg. fiber

14/12/13

CONGENITAL HYPERTROPHIC PYLORIC STENOSIS

- Andidone 3 mg/kg
- O2 > 9 = 4:1, 1st born male child
- Familial predisposition, mother 20%
- White > Black
- Erythromycin 1 x 1000 ml of the cord
C.F. - 1. Gastric outlet obstruction

2. Non-bilious vomiting, projectile

3. present 3-8 wks after birth (4-6 wks maternal)

4. Antenatal, postnatal child is normal

5. Stomach empty

6. Hungry child

7. No feature of PEM.

Exam -

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

USG - 1. Length of pylorus > 16 mm

2. "Wall" > 4 mm

- Empty Stomach

- Anterior Nipple Sign

- Cervix stretched sign

Rx -

- Electrolyte imbalance - Hypochloremic, hyperkalemia, metabolic alkalosis +

- Paradoxical aciduria due to presence of aldosterone
Fluid: 0.45% NS

2 + 2.5% Dextrose + KCl

HbL: Na+ 130 mEq/L, K+ 4 mEq/L, Cl- 100 mEq/L

Sx: Ramstedt Pyloromyotomy

Muscle splitting incision

Pyloromyotomy

Medial Management - Atropine

Not very effective

Can start feeding after 6th

GASTRIC VOLVULUS

Solid organ → torsion

Hollow → Volvulus

Organ axial → Mesenteric axial

More common

More
- Predispensing factor: Present/Absent
- Presentation: Acute/Chronic
- Complications: Common/Rare

*Bouchardat's Triad:
1. Epigastric pain
2. Retching, cough, vomiting
3. Inability to pass Ryle's tube

IOG: Barium meal - cupola fill sign

R4: Explora exploratory laparotomy
   ↓
   Denudate stomach
   ↓
   Gastroscopy

**GASTRITIS**

**Type A**
1. Autoimmune
2. Proximal part - fundus
3. Others → parietal cells

**Type B**
0. H. Pylori - Anteum
1. Ampicillin - Gastrostomy
HCl → Fe Deficiency anemia
I.F. I → vit B12 deficiency

Pernicious Anemia
→ Atrophic Gastritis
→ HCL
→ Gastrin↑

ULCER

GASTRIC
Duodenal

↓ Mucosal Resistance
H. Pylori 75%
↑ Acid production
90%

Pain - epigastrum
Meal ↔ pain
Meal → ↑ pain
Lean thinner pt.
Hunger pain
Obese

Complications
Perforation
Bleeding
Gastric artery bleed
Gastro-duodenal artery
Hematemesis/melena 60:40
40:60
Cancer - found
Rare

Rx - Gastricomy
Vagotomy + Drainage

* Cutting's ulcers are found in gastric, duodenal, peptic
* Dye used for H.pylori is WARTHIN-STARRY STAIN
Johnson's Classification

I. Incisura Angularis
II. Antral or Duodenal
III. Pre-pyloric
IV. Proximally at lesser curvature
V. Diffuse
  NSAID induced

1. Which are the ulcers associated with acid production:
   - Duodenal (II + III)
   - Gastric ulcer bleed (IV) (L. gastrica artery)

Vagotomy \( \rightarrow \) P \( \rightarrow \) \( \Rightarrow \) truncal vagotomy

Gastric motility \( \rightarrow \) Helicobacter P.-like

Intestine \( \rightarrow \) Coeliac P.-like

Selective
  \( \Rightarrow \)
  \( \Rightarrow \)
  \( \Rightarrow \)
  \( \Rightarrow \)

Highly selective vagotomy

Nerve of Latent / screwfoot
Thymic vagotomy →
1. GB stone
2. Post vagotomy Diarrhea.

5-7% of pts. → thymic vagotomy \\
selective vagotomy

lead to R. O.
↓
So, drainage operation required

1. Pyloroplasty
2. Finney's
3. Heineke-Mikulicz

2. Gastrojejunostomy

3. Antrectomy

Antrectomy + TV → least recurrence <1%

Highly Selective Vagotomy = no drainage required

Q. Best Vagotomy for the duodenal ulcer?

→ H.S.Y.
A & has least recurrence → Truncal Vagotomy (1-5%).

Reurrence in HSV → 6-8%.

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

Hence while doing HSV -
  extent → both proximal to G.E.T. (Incise point)
  7cm proximal to pylorus (head part)
  to preserve N/V of Cataract

* Hill & Backer Operation —
  Ant. HSV + Post. Truncal Vagotomy.
  → Prevent recurrence

* Seromyotomy —
  Ant. Seromyotomy + Post. Truncal Vagotomy
  Taylor Operation.

GASTRECTOMY
  Billroth I
  Billroth II
  Polya

Billroth I → obsolete now

Done for gastric ulcer

Kolherization →

Duodenum
Kocherisation → Mobilisation of duodenum

Bilroth II

Done for Gastro Cancer Preferred in cancer
Duodenal ulcer

 jejunoctomy

Polya →
- Retrocolic Procedure
  Preferred in case of ulcer
  Length of ascending limb

Ascending colon + Descending colon → Fixed.
Post Duodenal artery perforate → Bleeding

Ectopic pancreas

Greater saphenous vein

Pylorus

Jejunum

Lumen

Omentum

Contents

(a) Portal vein

(b) Bile duct

(c) Hepatic artery
Pringle's Maneuver:
- Clamp the liver omentum
  - It clamps the Portal vein, Hepatic artery together
  - To control bleeding fast if
- If it can't stop bleeding from Hepatic vein.
- Pouchet
  - When ulcer is proximal
- Clendev
  - When pt is stable
- Kelling Madlenen
  - When pt is unstable

Complication of Ulcer

Ulcer is deep → erosion is superficial

Hence when it heals, scarring it cause narrowing

Tea Pot Stomach

Hour Glass Stomach

If ulcer is on both ant & post surface.
600 is H/L caused by Ulcer in 1st part of duodenum

H/L of 600 → Cancer

- Perforation

- Guarding
- Board like Rigidity
- Tenderness, Rebound Tenderness → Blumberg Sign
- Pain on coughing → Dumbhey Sign
- Marking of Liver dullness

Inv → X-Ray chest under erect posture - 80%

- Gas Bell: 2. Dome of Diaphragm

- X-Ray Abd. under: 
  - Lateral Decubitus 
  - Most accurate (75%)
  - in erect posture - 70% accurate

CT Scan → Most Accurate

- Cupola Sign
- Football Sign
- Doge Sign → A lar cap like shadow due to air in Mornius pouch
Tell tale A
Falciform ligament sign

D/D of Pneumoperitoneum -
- Chilaiditi Syndrome / Pseudopneumoperitoneum
- Bowel interposition. H2W diaphragm level

Rx: Resuscitate
Exploratory laparotomy

I. Graham’s Omental Patch Repair + H. Pylori Eradication
    Heely performed 8x.

II. Graham’s Omental Patch Repair + HSV
done in 4 hours of perforation.
in young

III. TV + Antrectomy

In Gastric Ulcer Perforation

1. Omental Patch Repair +
   H. Pylori Eradication +
   Biopsy (malignancy pot)

2. Gastrectomy
   - not preferred
Post-duodenal ulcer may present as appendicitis.

Valentino syndrome

Renal Veil Sign

Air around kidney seen in X-ray or CT due to pneumoperitoneum.

Bleeding

Blood Supply of Stomach

25% of Blood from Gastria artery

Coeliac trunk supplies ampulla of vater

This is the site of Duodenal Atresia
Sup. Mesenteric Artery supplies 2/3rd of Transverse colon.

M/c of upper GI bleed → Peptic Ulcer

Parietal Ulcer diagnosed by Endoscopy.

And by sclerotherapy + adrenaline (arterial)

Sx -

Dr. Eaton: done horizontally

Stitched vertically (like pyloroplasty)

Longitudinal duodenotomy

Under-running literature of bleeding

Close the ulcer

Close duodenotomy like pyloroplasty.

Recurrence rate > 50%

If fit is fit

Trunical vagotomy

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 = Early satety.

Gastrectomy -
1. Loss of reservoir
2. Fe deficiency anaemia → duodenal ulcer
3. Bi deficient → in Buerke
4. Calcium deficiency
5. Steatorrhea
6. Recurrent ulcer - G.I. site → Stomach ulcer towards jejunum site
7. Gastro-jejunocolonic fistula
   → Best Dx by Barium Enema
8. Water absorp'
   5% → small intestine (jejunum) ileum
   25% → large

* Afferent Loop Syndrome -

Pathology:
- Kenn Key
- Int herniation
- Adhesion
- Twisted
- Strangulated
- Food entering in afferent loop

Stasis of bile

Diagram of afferent loop
Duodenal Bleedout
H/e. seen on 4th Day Post-operative

Avoid →

Side to side anastomosis
jejunojejunotomy.

Dumng Syndrome

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

10-15 mL released, rest: Miller's occurs.

If each contract: (Gastric Emptying is significant)

When pylorus is removed

Rapid Gastric Emptying

Hyperosmolar fluid enter intestine

Diarrhea

In 30-40 min pt. goes into Hypoglycemia.
Rapid exposure of Hyperosmolar food into SI

IF
Diarrhea
Tachycardia
Thirst
Vasomotor changes
Symptoms appear in 15 - 30 min.
<15 min → last for 30 min

Relieved by supine position

Hypoglycemia

Insulin release

[Recurrent hypoglycemia] Hypoglycemia [LATE DUMPING]

Last for 30 min., food can relieve

Rx - Diet → small frequent meals
avoid carbohydrate
avoid water & meal (dry meal)
Octreotide [somatostatin analogue]

Sx - Roux-en-Y
**FORREST CLASSIFICATION** (on basis of endoscopy)

I → Bleeding Uleer
   a → Spurt
   b → 00:30

II → Partial Bleeding
   a → Visible Vessel
   b → Adherent clot
   c → Coffee Ground Base

III → No Bleeding

**BLEED CLASSIFICATION**

BL → Angiographic bleeding
E → ↑ PT
E → Euvolemic Anemia
D → Untreatable Comorbid Disease

**WATERMELON STOMACH/GAYE (Image)**

Gastric Antral Vascular Ectasia

- Degenerative Cord
  - θ > 0°
  - Associated to CLD
  - CRD
  - Collagen Vascular Disease

Endoscopy:
- Longitudinally dilated tortuous vessel

Rx → Conservative → Argon Plasma Laser
Sx → Antrectomy
DIEULAFOY LESSON:

- Congenital malformation (Developmental)
- Submucosal dyertexy - keep on dilating then rupture
- Site: in 6 cm of GEJ
- Present & frequent haematemesis, melena, anaemia
  Recurrence is common

Endoscopy - upper spurring or clot

Rx: coagulation by endoscopy
  Endoscopy thermal probe coagulation

GASTRIC CARCINOMA

G: 0:1 g = 2:1

Age > 55 yrs

SEIWART CLASSIFICATION for GEJ Cancer

1/5

+ Risk Factor:
  - Diet - Vit C Deficiency - Prevaration
  - Salt Diet
  - Smoked fish
  - Nitrasureme compound
  - Refrigeration & protective factor
- Vet f.e. Ca deficency
- P. ent coma diet

- Fresh fruits & Veg - are protective

2) Pernicious anaemia
3) Bilary jaundice - either by partial gastrectomy or drainage
4) ERY
5) M. mucous disease

P. malignant cond:
1) Atrophic gastritis
2) H. pylori infec
3) Adenomatous polyp
4) Intestinal Meta plate III

M/e Polyp of Stomach -> Hyperplastic
    Fundic gland polyp

-> Meta plate (B & L)

LAUREN CLASSIFICATION

Intestinal

" O' > O "
" 0 > 00 "
3) Old age
" younger 3) Proximal part
4) Epithelial
" Familial
5) H. Pylori & Risk factor
6) Metastasis Blood borne 6) Lymph node metastasis
7) Intestinal meta plate III 7) Signet cell
8) Goblet cell 8) Poor Prognosis
Onco gene  APC (adenomatous poly.)  0  E-Cathédral L
MST (micro satellite)  p53 
 p16 
 BOREMANN (on growth pattern

I - Exophytic or cauliflower
II - Ulcerated, elevated, irregular margin
III - Diffuse margin
IV - Infiltrative

EARLY GASTRIC CANCER:
Cancer involving mucosa or submucosa + L Node

Blood borne metastasis

SUPERFICIAL SPREADING
- Common in JAPAN
- Good prognosis
- For esophagus x stomach ⇒ Imp prognosis indicator
  DEPTH
- For colon ⇒ Nodal status ⇒ imp. prognosis indicator
- M/I indicator for Metastatic Potential ⇒ DEPTH (T staging)
Japanese

I

II

III

IV

YE

General - Anaemia
- Pallor, cold

Local - Pain
- Dyspepsia

Metastasis - Node > Blood > Liver (through portal vein)

1) (a) Supraclavicular Node - Virchow's node
- Thoracic Liga.

2) (b) Axillary node - Inguinal node

3) Ovary - Krukenberg tumour

4) Pouch of Douglas - Blummer Shelf

5) Umbilicus - Sister Mary Joseph Nodule
- Not pathognomic of 
- Liver cancer
6) Liver → Nodular Liver / jaundice

- smooth
- umbilicated

7) Peritoneum →
   - Laparoscopy is best way to aus peritoneal metastasis

Paraneoplastic Syndrome -
1) Lesser Trelat syndrome - Seborrheic keratoses
   - on back.
   - Not pathognomonic of Gastric Ca

2) Tripe Palm syndrome -
   - Hyperkeratosis + Pigmentation
   - Not pathognomonic of Gastric Ca

Inv.
1) Endoscopy + Biopsy

2) Stage T
   - PET - CT
   - N
   - M

3) Depth → Endoscopy USG

4) For Metastasis → 18FDG PET Scan

5) Bar Meal -
   - Benign
   - Lesser curvature
   - Excleral fold
   - Haustral fold
   - Malignant
   - Greater curvature
   - Indo luminal
Hampton Line Uller

Carmen Meniu

Kuckling complex

Translucent line

Staging:

- N₁ < 3
- N₂ 3-6
- N₃ > 7

Min. L.N. removed

while radical gastrectomy for staging

Rx

M/c site for local recurrence → Gastrectic Bed

Anatomosis

Chemo

5FU + Leucovorin (folinic acid) ± Celestin

for 5 days. Oxaliplatin

Folfox → for colorectal Ca

Continuous expusion

S-1 chemotherapy → Oral

for 1 year

for advanced case

used in JAPAN → good results

oral derivative of Fluoropyrimidine

Tegafur + Gemearcil + Mitocil

Sx

© Radical Gastrectomy

Distal

→ Partial/ subtotal Distant Gastrectomy

+ → Billroth II
Proximal → Total Gastrectomy

Fundus → Roux-en-Y anastomosis (esophagojejunostomy)

Radical → Lesser omentum

+ greater "

L1, L2 nodes tell coeliac trunk.

D2 gastrectomy

Beyond coeliac trunk → D3 gastrectomy

RP → No residual tumor

R1 → microscopic disease left

R2 → macroscopic/gross disease left [PALLIATIVE]
If tail of pancreas is been involved

Do splenectomy + Distal pancreatectomy
+ D2 gastrectomy.

Roux-en-Y Anastomosis.

Gastrectomy +

Jejunum is divided +

Distal jejunum segment anastomosed to duodenum

Jejunum-jejunostomy

Duodenum

Jejunum

Y shaped

Lawrence Hunt pouch-

when there is less volume

Roux Clink 75cm

Roux Clink 75cm
**LYMPHOMA**

2nd H/c Stomach Cancer

H/c type → MALTOMA (Mucosa associated lymphoid) associated with H. Pylori

NHL → B cell, DLCL

GIST (Gastro-Intestinal Stromal Tumour)

- 2%
- Earlier called as Leiomyosarcoma.
- Origin - Interstitial cell of Cajal
- 95% → C Kit +ve → act through Tyrosine Kinase
- 5% PDGF +ve → Better Prognosis

Atypical / Wild GIST

C Kit -ve
PDGF -ve

50% → Stomach
25% → Ileum
Rare sites - Rectum, Esophagus

H/c Benign tumour of Stomach - Melanchymal tumour or Leomymoma

H/c presentation → Bleeding

Metastasis → Blood Borne → Liver
Direct → Surrounding area
Node → rare
**Hyper**

**SPINDLE CELL (30%)** → **EPITHELOID (30%)**

**FLETCHER CRITERIA**
1. Size > 5 cm.
2. Metastasis
3. Metastatic Index > 5/50 HPF

**Ixoc - CECT**
- No Biopsy → ↑ dissemination / Bleeding
- Ixoc for Recurrence → PET SCAN

**Tumour Marker** → **CD117**
- DOG1 (Detected on GIST)
- CD34
- Bcl 2
- Protein kinase c theta

**Rx Surgery** - 2 cm Margin (> 1 cm)
- Radioresistant
- Adjuvant therapy → Tyrosine Kinase Inhibitor III
  - Imatinib Mesylate (Gleevec)

For Imatinib Resistant case
- Sunitinib
  - Causation Hyperphosphatemia For Sunitinib (R) case
  - Regorafenib
Carcinoid Triad → GIST
    → Paraganglioma, Extra-adrenal Phaeochromocytoma
    → Pulmonary Chondroma

Carcinoid dyad / Stratakis dyad
1. GIST
2. Paraganglioma

DUODENAL ATRESIA.

- 1:2500
- Site: just distal to ampulla of Vater
- Presentation → recurrent bilious vomiting
- Associated 1/2 Down's Syndrome
- 50% Polyhydramnios

**Types**

<table>
<thead>
<tr>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall intact</td>
<td>Wall &amp; gap↓</td>
<td>Wall &amp; gap↓</td>
</tr>
<tr>
<td>Meconium intact</td>
<td>Meconium intact</td>
<td>Meconium intact</td>
</tr>
</tbody>
</table>
Wind Sock Deformity → false appearance of defect in deformity despite of proximal

Appel Pkell Sgn → seen in Bl type

X-ray abd in erect posture

Double Bubble Sign (Image)

in case of cong. obstruction of

2nd part of duodenum

1) Duodenal atresia

2) Annular pancreas

3) Ladd's Band

Rx:

Diamond shaped Duodeno-duodenotomy

Annular Pancreas → Duodeno-duodenotomy (D-D)

Duodeno-jejunostomy (D-J)

Retroduodenal
Superior Mesenteric Artery Syndrome (CT Image)

or Wilkie Syndrome

or Cast Syndrome

- Young, lean, thin lady
  due to loss of fat around duodenum
  
  $\theta < 20^\circ \Rightarrow$ SMA syndrome

$D_x \rightarrow$ CECT

$R_x$ - Duodeno-jejunostomy

Compression of $\mathcal{C}$

May be seen with syndrome

- Common iliac vein by $\mathcal{C}$
- Common iliac artery
LIVER

Anatomy was proposed by Couinaud.

Port. Ant. (Anterior) I.Vc. Liver has 2 Lobes.

48 sectional sectors

8 segments

Lateral

Med.

Falciform ligament

C.B. (medial edge of a.b. fora)

Bismuth - Antero medial - 4a, 4b, 3.

Posterolateral - 2

3 Major Fissure

Vertical Line

2 Lines

Horizontal Line
Cantle's line & middle hepatic flexure.
Horizontal line is based on Portal vein.

Base area of Liver

Segment 1 – behind 4a
: Spigelian arcade
Caudate lobe: Pyloraval
: Caudate process

Segment 4: Quadrant lobe

Segment 1 has blood supply on both lobe (BR)

Segment 1 drains directly to IVC.

Budd Chiary Syndrome
- Hepatic veno thrombosis
- All cause: Polycythemia vera
- Segment 1 is spared due to direct drainage to IVC
- So it undergoes compensatory hypertrophy
Fallopian ligament Btw 2,3 → 4a, 4b

Riedel's lobe -
  In few persons, extension of R lobe is present
  It is palpable.

- L Lateral Hepatectomy → only 2, 3 removed
- R Extended
  1a, 1b + R lobe of liver ±1.

- R Hepatectomy → 5, 6, 8, 8
  L → 2, 3, 4a, 4b, ±1

Indication of L Lateral Hepatectomy-
 Liver transplant from Donor - 3rd.

Regeneration of Liver → 3/2 → 1/3

LIVER ABCESS

AMOEBAIC ABCESS

- Liver → R lobe → posterior-superior quadrant
- 0° > 90° 8-10 pm
- Young age (20-40)
- Presents with pain, hepatomegaly
Usually single
- Colour of pus - Anchovy sauce
- Fish culture -> no pathogen.
- Scraping of wall -> amoeba
- Lung Comp-
- Serology -> ELISA, > Indirect Haemagglutination Test
- LFT -> jaundice 10%
- Alk Phosphatase ↑
- USG -> IUC, CECT -> Peripheral Enhancement
- Rx - Metronidazole 750mg TDS for 10 days
- Drainage is NOT much required.
- Abscess takes approx 9 month to resolve.
- Follow-up -> USG initially weekly then monthly

USG guided Drainage-
1) Size > 4cm (>10cm - absolute indication)
2) impending rupture or ruptured
3) Immune compromised
4) DM
5) F
6) Lobal abscess -> rupture into pericardium leading to tamponade
7) Doubtful pyogenic abscess
Pyogenic Liver Abscess

Route:
1) Bile duct → cholangitis (E. Coli)
2) Portal vein → portal pyemia
3) Hepatic artery → staph. aureus
4) Contiguous.

M/c cause in adult → E. Coli
M/c " in children → staph. Aureus
M/c granulomatosus → staph. aureus

M/c cause in Asian → Klebsiella
M/c cause in pyogenic liver abscess & endophthalmitis → Klebsiella

F: 0°-90° 2-3 cm

1) Fever
2) Migraine 75% → cluster & CT
3) Systemic Disease ↑
4) Fever > Pain
5) Serology -ve.
6) LFT deranged
   Bilirubin ↑ (30-40%)

Rx: Antibiotics & Drainage
GRANULOMATOUS ABCESS
- NADPH Oxidase dysfunction
- CT Scan → enhancement in peripheral
- Percutaneous Drainage + IFN-α (intravenous)
- Autotransplantation

PORTAL HTN

\[ \text{PV} \]

EMV II MV

P - 5 - 10 mm Hg
\( >10 \) → portal HTN
\( >12 \) → Variceal develop

Causes
Pre-hepatic →
1. Portal Venous Thrombosis
2. Extra-hepatic portal hypertension

\( \text{pre-sinusoidal} - \text{schistosomiasis (M/Chinese)} \)
\( \text{Hepatic} - \text{sarcoidosis} \)
\( \text{sinusoidal} - \text{cirrhosis} \)
\( \text{Post-sinusoidal} - \text{Central Vein Thrombosis} \)
\( \text{Veno-occlusive disease} \)
\( \text{Budd-Chiari} \)
Portal Triad - 1) Hepatic Artery  
2) Portal Venule  
3) Bile Ductule  

- Neurons originate from central part.  
- Neurons spread from centre to periphery.  
- Post - Hepatic → Budd-Chemiey  

YE  
1) Splenomegaly (rule in PHTN)  
2) Ascites (↑ Hydrostatic acid)  
3) Varices  

3)  
Geurdeehber  
Baumgarden  
(Burst umbilicus)  

Diagram:  
- Gastroesophageal (GEJ)  
- Short gastric  
- Caecum Medulla  
- Sphincter  
- Hindgut Retal  
- Int. Haemorrhoids
   ↓ Back (Retroperitoneal)
   They ↑ the incidence of Hepatic Encephalopathy

IV
1) Varices → Endoscopy
   Esophageal → Bar Swallow
   ↑ Risk → cherry Red dot
   Whitish appearance
   Blue Wheat marking

2) USG. → PV diameter (N) < 1.3 cm. = 13 m
   ↑ > 1.5 cm = PHTN.

   CHILD'S PUGH SCORE → Read

Rx - End to side Porto-caval Shunt

Emergency Prophylaxis Definitive

1) ABC
2) Drugs. Octreotide (DDC)
   Somatostatin.

   Valopresin. → potent vasoconstrictor
   Terlipresin (cause Meningora Sphaerone)

   If it has to given. + NTG

Endoscopy → sclerotherapy
(Endo, Transp.) Band ligation (EVL) - safer
Sclerotherapy - Ethanol amine oleate, sod. tetra decay sod., sod. Mercuriate

*Balloon Tamponade*

When we retroflex endoscope, sclerotherapy is difficult.

So Balloon Tamponade by Sangtran Blakemore tube

- Gastric Balloon - 200 ml - 300 ml
- Esophageal - 25-40 mm Hg
- 1 mm HD tube for aspiration esophageal

Max permissible time is 24 hours

$\frac{g}{24}$ hr - cause Ischaemia gastric

Minnesota Tube - $\frac{1}{2}$ for saliva

1 more part

TIPSS (Transjugular Intrahepatic Portosystemic Shunt)

- Using CO₂ venography
- It is temporary as it gets blocked in 1 yr.
- Retch needle $\frac{1}{2}$ wed
* Indicate 0 TIPS- 

1) Intractable Bleeding
2) Ascites
3) Before transplantation, if risk of variceal hemorrhage.

Complications S/E:
1) Encephalopathy
2) Bleeding Risk
3) Not done for Prehepatic Posthepatic

"Devascularization + transection = Sugica Procedure"

20% Mortality

Transport

<1yr TIPSS

>1yr Sugica

Prophylaxis:
1) Propranolol
2) Isosorbide mononitrate

In High Risk: EVL
5. Eletrotherapy has no role
Definitive T/t

- Total Shunt -
  - End to Side Portocaval Shunt
  - Side to Side portocaval shunt

- If shunt < 1cm => Partial Portocaval / Mesentericocaval H graft

- Selective Shunt -
  - Distal splenorenal shunt
    (Warren shunt)

- (C) sided Portal HTN ±

  - Caeus - splenic Vein
  - Thrombosis

  - Presentation - Splenomegaly
    - Gastro fundal varices due to gastri artery

  - Rx - Splenectomy
    - Spleno - renal shunt
H/c cause of Portal HTN in children →

① Non-corrected Portal vein / Fissure.
② Extra-hepatic Portal vein obstruction
  <15 yrs

Hepatomegaly

Indicator of Rex Shunt
  - shunt for Pre-hepatic

Rex Shunt

H/c Benign tumour of Liver - Haemangioma

HAEMANGIOMA
  - Benign
  - Middle age
  - Hamartoma
  - Benign incidentaloma (tumour found by incidental exam)
  - Encapsulated
  - Enlarged associated
  - Asymptomatic
  - Giant: > 5cm → cause thrombocytopenia
Kasabach–Merritt Syndrome

Haemangioma

Variable

Kuiffur ulcer

Peripheral enhanc Hosux

Clonality: Poly

Mono

MN

Symptomatic

Symptomatic

Enucleation

Bleeding → Angioembolization

ADENOMA

Focal Nodular Hyperplasia

Q > 0°

20–40ys

Encapsulated

Single

OD Pill

Only supplied by Hepatic A

Hepatocytes

Glycogen

Risk of Bleeding

Cancer

Portal Tread

Kuiffur cell

Risk of Bleeding

Cancer

Only Liver Tumor in Kuiffur cell

Stellate scar

CT-Scan

Angio→ spoke wheel pattern

Fibrolamellar

25% A

Capsule

Central Scan

FHN

+nt

+nt

-nt

-nt

+nt

+nt

-nt

-nt

Variable

Mono

Mono
* Spoke-wheel Pattern in CECT
  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

H/I: Haemoperitoneum due to Trauma → Adenoma
  in OCP taking OC pills →

* FNH → stop OC pills
  keep under observation
HCC / HEPATOMA

- 0°-90°
- old age
- East Asia + East Africa → Taiwan [Hep B]

Risk Factors:
- 1) Viral - Hep B > c
- 2) Cirrhosis 4/5 - Viral ↓ High Risk
- 3) Alcohol
- Cryptogenic - Mod.
  1° Biliary cirrhosis

3) Chronic Active Hepatitis - High
4) Metabolic:
   - Haemochromatosis - (High)
   - Sydenham - (High)
   - α, antitrypsin deficiency
     - Wilson's - low
   - Autoimmune

5) Aflatoxin - B
6) Alagille syndrome
7) DNS III
   - NASH
8) Polyvinyl
   - Polyvinyl chloride - cause angiosarcoma

EF

Vague
2) Hepatomegaly → all are seen late
   - Jaundice → 1/0 inoperability
Paraneoplastic Syndrome

- Hypoglycemia
- Hypercholesterolemia
- Polycythemia
- Hypercalcemia

Inv
- USG → follow-up.

- CECT → IOC – Triple phase
  Initially Tumour gets hyperdense early uptake
  then Liver gets hyperdense → Release.

  Tumour gets hypodense

  Multiple Hypodense Liver Tumour ≥ 2 cm
  Liver Vascular

Tumour Marker:

1. [AFP] – t½ 5-7 days.
   - Non-seminoma
   - HS

For follow up. Nowadays used for diagnosis

If AFP > 400 + CECT diagnose

No Biopsy Required for Diagnosis of HS
(2) PIVKA → Protein Induced by Yet K Absence

de-gamma carboxy Prothrombin

(3) AFP

(4) Hep PAR-1

Rx: Radioresistant

Chemo:

Surgery → Inoperable T

SORAFENIB (oral)

Regorafenib

Liver func. is required.

Hepatectomy

Perihep.

>35%

<30%

poor

Hepatectomy

Auto彭e PV

Induce liver

Regeneration

(NIMURA TECHNIQUE) (5) Li Max

Helenalin + C\(_{13}\)

CYP1A2 (Liver) → PnM + C\(_{13}\) → CO\(_2\)

in Breath

WhatsApp: http://mbbshelp.com/whatsapp
* Transplant

MELD Score - End Stage Liver Disease

>10

**MILAN**

Criteria for transplant:

1) Single <5cm (T1)

2) Multiple tumors <3cm in no.
   <3 cm in size

3) No Major Vascular invasion

**Other T/A 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

   Up to 2cm
   Tx <5cm can be used
In case of vein in proximity to target act a heat

Melphalan

TACE (Trans arterial Chemo Embolization)

C/I to TACE

1. PV Thrombosis
   - Liver cells do not get
   - supply as blood will be blocked
   - Cisplatin

2. LFT abnormal
3. Encephalopathy

TARE (Transarterial Radio Embolization)

SIRE (Systemic Internal Radio Embolization)

- Yttrium 90 is used

Prognostic Indicators

- OKUDA
- CLIP
- BCLC
- Tumour Size
- Bcl2
- Child Score
- LFT
- Ascites
- CA19-9
- Albumin
- PV Thrombosis
- O1 Child Pugh
Karnofsky Score
ECOG (Eastern Cooperative Oncology Group)
0 - 5 about performance status

5-year survival rate - ±5% ±%

FIBROLAMELLAR CANCER

- G > 0

- 20-40 yrs

- Cystitis is not a risk factor

- Tumor is well circumscribed
  not encapsulated

- 50% show calcification internal mass may be a feature

- Tx: Surgery

- Metastases late, LNR involve

- T/F - only surgery

- Nodal excision
A. Liver: 2nd cause of calcification?
   1) Colorectal mucosal Ca
   2) Breast
   3) Ovary

HEPATOBlastoma

1) Tx of children < 3 yrs
   2) Rest Chemo responsive.
   3) RX - Neadjuvant chemotherapy → Surgery

SIMPLE HEPATIC CYST

- Congenital
- Risk factor for Ca
- It is sequesterated bile duct, not communicating
  o Bile duct
- Lined by cuboidal cell
- Fluid → Plasma
  - No Bile
- CT scan → Hypoechoic

RX
- If asymptomatic → aspirate + sclerosing agent
- Symptomatic → Deroofing (laparoscopically)
QUINKE's TRIAD - HEAMOBILIA
Cause - Injegence (Biopsy)
Pain
Jaundice → Melena → > 50ml
Bleeding

[Diagram: Occult blood stool]

Diagnosed by Angiography

T/H - Angioembolisation

BILHEMIA

1. ERCP

ATIMS 2017
GALL BLADDER

23/12/12

CBD LVR - 7cm.

CHD 2.5cm

* Part of CBD -

1) Supraduodenal

CBD 7.5cm

2) Retroduodenal

3) Intraduodenal

Retroduodenal & Intraduodenal part are inaccessible.

Boundaries -

1) Inf. Border of Liver

Calot's A

2) cystic duct

(cholecystohepatic) 3) CHD.

Content -

1) Rb: Fibrinopaty tissue

2) Cystic artery

3) L.N. of LVRd / cystic node

Initially this was called Calot's A.
Anatomical aberration → Morgi Monghian’s Hump
Sedentary Hump

Prone to injury in cholecystectomy.

25% of individuals have anatomical defect.

M/C Congenital anomaly

Shape: lobular

Anomaly

Vol. of GB = 30 cc

Bile & concentrated stone in GB.

Absorption → Na⁺, Ca²⁺, H₂o

Lumen

Sphincter

Body

Heister

Neck

Hartmann's Pouch

Epithelium: columnar (Simple) M/C site for Gallstone lodging
19. Histology → No submucosa
   - No muscularis mucosa
   - Crypts reach up to muscle
     (other gut organs, crypts are only up to mucosa)

Rokitansky–Aschoff Sinuses (RA sinus)

- Crypt of Lushka
- Gland proliferation in muscle → Adenomyomatosis
- Cholesteral deposit in crypts → Cholesterosis
  - Strawberry GB
- If sinus goes out → GB diverticulum

CHOLELITHIASIS

Type:
1. Mixed
2. Cholesteral
3. Pigment

Hle type in India:
- Black
- Brown

Hle type in India causation:
- Cholesterol content >70% → Infection
- Haemolytic anaemia → Stone common in Asia

Oriental cholangitis / Recurrent pyogenic cholangitis
* Pathology of Brown Pigment stone

1. Ecl. hlekhekela $\rightarrow$ produce $\beta$ glucuronidase

2. Unconjugate the conjugated

3. Bile

- Produce stone

* Etiology:

1. Supersaturation of Bile

- Cholesterol $\uparrow$

- Bile salt or lecithin $\downarrow$

- Crystallization

- Nucleation

- Growth

2. Static

3. Nucleation

- Causes of cholesterol $\uparrow$

- Fat, juvenile, female, or pretty $\rightarrow$ mal phe

- Obesity

- Unbalance therapy

- Rapid weight

- Fat

- Age
Bilio-pancreatic diversion → Bariatric surgery for morbid obesity

Causes of Bile Salt↓
1) Malabsorption syndrome (↓ Enterohepatic circulation)
2) UC
3) Crohn's
4) Coeliac sprue
5) Liver rejection
6) Hepatic steatosis
7) 1st Biliary Cystadenocarcinoma
8) CYP 7A1 deficiency, mutation
9) HDR → 1 Lecithin

Causes of Starvation:
1) Duodenal vagotomy
2) Prolonged starvation
3) Total parenteral nutrition
4) Somatostatinoma
5) Octreotide therapy

Causes of Pronucleation:

1) Lipoproteinemia → ↓ nucleotides
2) Lipoproteinemia deficiency
3) Deficiency
1) Asymptomatic
   Keep under observation

2) Biliary Colic
3) Cholecystitis
   - All features of inflammatory disease
   - Pain (1) Hyperchondriac
   - Radiating to back, (2) shoulder
   - Hyperesthesia posteriorly at 11th or 12th I.C. space
     (Boas' Sign)
   - Murphy's Sign - Jendrassik on deep inspiration in (2) Hyperchondriac

4) Acute Cholecystitis
   - Recurrent
   - Chronic - thick walled, contracted
   - Empyema - thick walled, purulent
   - Mucocle - stone proximally rotated, impacted
     enlarged

95% → Calculous Cholecystitis

5% → Acalculous Cholecystitis
   - Cause - Buerger
   - Shock
   - Pneumoperitoneum
     prone to gangrene
     Immuno-compromised
     Neutropenia

Typical by ETA, primary organism - Enterococcus
   Cause Empyema, pus
   Cholecystitis/Cholecystitis
- Empyema: Pyonephrosis → E. coli

- Invasive (Inv.)
  - USG → IOC: Hyperechoic, acoustic shadow
    - Most accurate behind stone
  - CT scan: Not a good modality.

- Cholecystitis
  - USG → IOC
  - HIDA scan: Most accurate
    - Non-visualization of GB
  - CT scan

- On basis of accuracy → HIDA
  - CT scan
    - USG
    - HEX triad/sign
      1) Wall thickening
      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 - BCT modality
Champagne sign in USG, CT (Image)
multiple effervescence

In X-Ray - only 10% stone are found (radiopaque)

Mercedes Benz sign - Y

Seagull sign - Y

To differentiate Renal stone & gall stone
Take lateral view.

On the spine In front of spine
(Renal stone) (Gall stone)

Management of Ac. Choleystitis -

Old Protocol - Conservative sx

- Divert.

> 6 weeks

- Interval Cholecystectomy
New → Immediate Cholecystectomy

in 2-3 days

Acalculous Emphysematous Cholecystitis → Untt.

Cholecystectomy → Cholecystostomy → Not advised in Bengue.

A 75yr old lady was case of asymptomatic gallstone & case of terminal cancer. Life expectancy 3mths. She develops Cholecystitis?

Cholecystectomy

CHOLECYSTECTOMY

1) OPEN
   a) Approach through cystic duct (Calot's A)
   b) Approach through liver
      • Fundoscopic Retrograde
      • Cholecystectomy

2) Laparoscopy
   1st Laparoscope surgery → ERIC MUHE
Umbilical incision 10mm.

Venous Needle

Hilical artery

10mm (for camera)

CO2 used

Pressure of ext. 6 (10-15mmHg)

12mmHg

Take needle out of

Put tube inside

Marilyn

Hilical artery to keep (artery forceps)

Gall bladder is removed from Hilical artery Port

OPEN to exclude entry

Hilical artery

When umbilical is not available (image), we approach through Palmer's

Hilical artery 1cm. Palmer site

2cm below navel site

Venous needle (image)
SILS - Single Incision Laparoscopic Surgery

DNTB 15

NOTES - Natural Orifice Transluminal Endoscopic Surgery

Flexible Endoscope

Scarless Procedure

Physiological Changes & Comp of Laparoscopy:

1. Perforation

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

3. CO₂ Rate → < 1 litre/min.

If IVC is compressed → ↓ Venous Return

↓ Preload

↓ EF

↓ CO

↓ HR

↓ JVP

Afterload ↑ leading Systemic Resist ↑

4. Diaphragm elevated

↓ Vital Capacity

↑ Pulmonary Resistance

pO₂ ↓

pCO₂ ↑

5. If aorta compressed → ↓ Renal Perfusion

↓ UFR

↓ urine output
↑ Aldosterone / Renin ↑ — ↑ Peripheral Vascular Resistance ↓

↓ Afterload

6) If ↑ retention of CO₂ — Resp. acidosis

↓ Cerebral vasodilatation

↑ CP.

Complication of Gall Stone

Gallstone ileus.
- 100% case — Cholecysto-duodenal Fistula / Cholecystenteric
- Commonly seen in old pt.
- Ptf
  - Ptf have had many attacks.
  - Size of stone > 2.5 cm
  - Stone get stuck — 2 feet proximal to ileocaecal
    junction (Duod ileum) or
df ileocaecal junction
  - Ptf present — Small Bowel Obstruction

↑ Inv — LEPT

RIGGELER'S TRIAD — Radiopaque shadow in ileum
  - Marked bowel distension
  - Air in GB (Pneumobilia)
Tx → Surgery → Relief obtained.

Cholecystectomy, usually not done now.

Open ileum at mid-ileum.

Bowel ileum not opened due to leak.

* Bouveret Syndrome -

Stone gets stuck in 1st part of duodenum

Present, like gastric outlet obstruction.

* Mirizzi Syndrome -

In chronic cases, gallstones are lodged in hepatopancreatico-duodenal pouch may compress CBD from outside

Obstructive jaundice

May lead to formation of fistula

Types D in Sanders classification denote fistula

Saint's Triad → 1) Gall Stone

2) Duodenal

3) Hiatus Hernia
Cholecystectomy

* Indication of Asymptomatic Cholecystic

1) Size > 3-4 cm
2) Multiple small stone in wide cystic duct
3) Immuno compromised pt
4) Typhoid Carrier
5) UB Polyp
6) If stone > 10 mm.
7) Porcelain UB → Calcified (PRE-malignant).
8) Hemolytic anaemia or Gallstone
9) Ruptured surges (few of them)

Medical Rx

Unileodoxcholic acid or chenodeoxycholic acid
for 6-8 mm to 2 yrs.

Indication

1) Size < 2 cm / single
2) Functioning UB
3) Non - calcified stone

Biliary Dyskinesia

- Group of Conditions

- Cholecystopathy → Improper Contraction of CUB

Cholecystectomy

But Inv → HIDA Scan

Effective Fraction < 35% → Hecatey Disease
Sphincter of Oddi Dyskinasia:
- NARDI Test
- Obsolete Test Now
- Administer Neostigmine + Morphine
  - Induce pain
  - Measure samples, lespec
  - If TT → Test true
  - Manometry → IOC

T/t → Sphincterotomy by ERCP.

CHOLEDOCHOLITHIASIS

1° → 2°
- stones in CBD from gall bladder
- Brown pigment stones ary in CBD
- Recurrent Recurrence

After CBD removal if
- CBD < 2yr → 2yr → Recurrent
- < 2yr → Retained

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
YE →

1) Present → Cholangitis (Type of Bell of ERD)

Orgie → E. coli, Bacteroid.

(1) CHARCOT’S TRIAD.

a) Pain
b) Fever

c) Jaundice

Cause of Intermittent Jaundice

(1) Cholangitis

(2) Periampullary Ca

2) Rx

1) Pt responds to antibiotics 70%

In few pt it progresses to Reptasia.

RAYNAULD’S PENTAD – Charcot’s triad

+ Shock

+ Coma

Dress Pus. by ERCP + Decompression -

Sphincterotomy +

TVP

IOC → MRCP. (Non-Invasive)

ERCP – equally good but due to invasive procedure, no diagnostic role

- CBD stone

- Stone

- Cholecschel cyst
Biliary Leak → ERCP

For Cancer → PET stage

H homeless → EUS

Hepatobiliary

- USG
- LFT

USG

Suprapancreatic stone

Stone visible

LFT → conjugated hyperbilirubinemia

Alk Phosphatase > 2.5 times (N)

also ↑ osteoblastic bone 2°

1) USG GD, → CBD ≥, LFT (<) → Cholelithiasis

2) USG - gallstone, CBD dilated, LFT altered →

go for HRCP.
<table>
<thead>
<tr>
<th>Case</th>
<th>Procedure</th>
<th>Case</th>
<th>Procedure</th>
<th>Case</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. USG - Gallstone CBD (N) LFT (N)</td>
<td>Cholecystectomy</td>
<td>2. USG - Gallstone CBD dilated &gt;1 cm. LFT - obstructive jaundice</td>
<td>Cholecystectomy</td>
<td>3. USG - Gallstone CBD - CBD stone LFT - obstructive jaundice</td>
<td>1st ERCP done MRCP. date lap. cholecystectomy</td>
</tr>
</tbody>
</table>

*Cholecystolithotomy -
Lap. → ha, <60% success rate & tough.*

*Supraduodenal*
1. Cholecystectomy
2. Supraduodenal choledochotomy

Dejardin'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 puts - Minimum sign seen.

After 24 hours, T-tube is removed.

Hole epithelial by itself in 24-48 hrs.
**How to Remove Retained Stone when T-tube is in-situ?**

- T-tube cholangiogram shows stone (usually dense)
  - Leave T-tube for 5 weeks
  - Fibrosed channel is formed
  - Choledochoscope or Dormia basket through T-tube
  - Remove stone

  **BURHENNE TECHNIQUE**

- **Choledochoduodenostomy**
  - If there is duodenal obstruction in CBD, CBD dilated, open CBD to duodenum and anastomose them.

- **Pre-requisites**
  - CBD > 1 cm
  - Age of anastomosis > 2.5 cm

- **Risk of anastomosis**
  - Cholangitis is very high as there is no sphincteric

- **SUMP SYNDROME**
  - The part of CBD is left open to choledochoduodenostomy → growth of bacteria, stone, etc.
  - Complication of this surgery
If pt. is unetable in case of gallstone + CBD stone +
cholelithiasis jaundice
we don’t go for NREP
Proceed to REP + decompression

CHOLEDODCHAL CYST

- Incidence 1:20,000 (variable)
- Etiology - anomalous bile duct, pancreas, enteric
  sphincter of Oddi dyshormone - Epley

Alimentary classification / Todani

I → Mil type

II → Diverticulum

III → Choledocalcele
  Intramural dilatation

IVA → Extra - intrabiliary bile duct
  atresia

IVB → Extrahepatic atresia

V → Intrabiliary atresia
  CAROLI'S DISEASE
  Intramural
Porto-jejunostomy Procedure / Kasai Operation

- Type IV

- ATS MS

- In Caroli's Disease
  - CT → Central Dot Sign
  - Jejun

- 3 cc for Intrahepatic Atresia ⇒ Liver Biopsy

- 10 cc for Extrahepatic Atresia ⇒ HIDA Scan

- USG in Biliary Atresia
  - Triangular cord sign
  - Ghost gall bladder
  - Latreille GB < 1.8 cm

C/F

1) Cholangitis ⇒ Lump

2) Pre-malignant ⇒ 22% HJK

3) Rupture → can cause Biliary Peritonitis

-inv

- USG followed by MRCP

- T/t

1) Cholecysto-duodenostomy
  - Not done nowadays since ↑ chance of infection
  - HGA HJK
2) Roux-en-Y Hepaticojejunostomy

Remove GB CBD

Divide jejunum

Anastomose to common hepatic "end to end" duct

jejunoo-jejunoanastomosis anastomosis

HUTSON LOOP

for Recurrent Pyogenic Cholangitis - wet diathermy

Make a Roux-en-Y Hepatico-J anastomosis

Take Roux limb to skin

Advantage - to approach easily by endoscope whenever required
CBD Injury & Stenosis

H/C: \textbf{Jaundice}

Bismuth classification:
- Type I: > 2 cm
- Type II: < 2 cm
- Type III: Confluence is frequent
- No length of CBD
- Type IV: "junc" is gone
- Type V: Post-sectoral duct injury, deg 6 & 7

Strasberg classification:
- A: 
  - Right stump blowout
  - C.B. fonsa leaked
  - Don't treat - Bile duct leak
- B: Ligation of R hepate or post-sectoral duct
- C: Transection of R hepate / Post sectoral duct
- D: Lateral injury of main duct
- E: Stenosis
  - E1, E2, E3, E4, E5 \Rightarrow \text{Same as Bismuth}
Approach

1. USG guided drain — CECT gives best impression
   Wait for day 1 or 2 — 7 collection
   Bile leak
   ERCP
   ① Cystic duct leak (Bismuth I)
      ① put a ERCP stent
      ② or do open & lap — put 3-6cm again
         re-explore & re-ligate

2. If there is niche in CBD.
   small neck — repair over T-tube

3. If CBD is transected at any level
   Roux-en-Y Hepato-jejunostomy
   Don't prefer Roux-en-Y — choledocho-jejunostomy
   small blood supply is from above
   down wards
   Hence, Higher we go — better results
GB Cancer / CHOLANGIO CA.

GB Ca

- \( q > 0 \)

- Poor prognosis

Risk Factors for Both

1. Cong. Hepatic Cyst
2. Calcoli's Disease
3. Choledochal Cyst
4. Von Meyenburg Complex - Biliary Hamartoma
5. Worms - Clonorchis Sinensis (Chinese Liver Fluke)

6. Sclerosing cholangitis

7. Toxin - Hordeum (was used as dye for angiography)

5. Drugs - etiogen -
- 1-methyl dopa
- INH

6. 1st Biliary Cystosis
7. Cholelithiasis
8. Typhoid Cancer

GB Ca

H/F

- \( q \)

- \( \rightarrow \) soy

- H/C H/C - Fundus
- H/C type - Infiltrate
- 90% → Gall Stone
  → Nevin classification is for Ca GB.
  - Common in India (North)

Inv
  1st Inv → USG → Mass replacing GB
  date presentation
  CECT & PET → IOC

Tumour Marker
  CA 19-9
  ↑ in > 70% cases
  Mucine monoclonal Ab.

T1b
  Subsite
  T2
  T3 one surrounding organ involved
  T4a venel invasion
  T4b two organ involved

T1s → open cholecystectomy is done

Lap cholecystectomy → if extraction bag used
  If extraction not used → Port site excision
Port site excision Role -

1. Therapeutically
2. Staging

T1b \( \Rightarrow \) Wide excision

\( \text{ten}^\circ \text{ margin of liver tissue excised} \)

\( \text{T2} \Rightarrow \text{Extended Cholecystectomy} \)

Remove -

- Liver omentum
- Cystic node
- Liver segment IVb + IV

\( \text{If cystic stump +ve for tumour cell} \)

\( \text{or cystic node +ve} \)

\( \text{then, CBD is also removed} \)

- Peyquet Roux-en-Y hepatoc-jejunostomy

- Poorly Chemo sensitive \( \Rightarrow \) 5FU +gemcitabine

- Cholangioc Ca

\( \text{Bismuth classification for Ca} \)

- I \( \Rightarrow \) below junct
- II \( \Rightarrow \) at junct
- III \( \Rightarrow \) above junct
- IV \( \Rightarrow \) intrahepatic
Klatkin → Type II
Better Prognosis

H. C to site → Type II.

PANCREAS

Ca Pancreas → 3rd H.C. Cancer in GIT.

Exocrine → 98% → Adenocarcinoma (98%)
Endocrine → 2% → Insulinoma → H.C.

Insulinoma

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

- Encapsulated
- Presentation: Hypoglycaemia

Whipple’s Triad - attack of hypoglycaemia
- Blood sugar < 50 mg/dl & presentation
- Become (2) blood sugar

Not pathognomonic of insulinoma
- Insulin/sugar ratio > 0.3
- Most accurate biochemical test = 72 hour fasting sugar value
  - Insulinoma/Inj of insulin
    - go for c-peptide

- Inj of insulin.
  - Insulinoma

- Insulinoma against sulphonylurea toxicity
  - c-peptide ↑ in both.
    1) Sulphonylurea level
    2) Insulin/sugar ratio.
      if > 0.3 ⇒ Insulinoma

- GASTRINOMA.

  2nd M/c Endocrine Tumour
  - MEN → M/c tumour.
    - MEN → WERMER SYNDROME
  - > 50% → malignant/multiple

  - Intersplanchnic tumour → as it come from duodenum
    - Gastrinoma - M/c Intersplanchnic Tum.
PASSARO Δ 1. Time 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 ulcer → unusual pattern, refractory
3) No β-Cell tumour of pancreas

Presentation -
1) Pain
2) Diarrhoea - due to hypertrophy of guttate muscle

Diagnosis:
5) Gastrin level > 1000 → malignant Gastrinoma
   (N) level ~ 150

Borderline case → 150 - 500

4) Secretin Stimulation Test
   (N) Gastrinoma
   ↑ Gastrin
   ↑ Gastrin

3) Basal Acid Output
   (N) ~ 5 - 6 mEq/hour
   In gastrinoma > 15 mEq/hour
(3) \( \text{Bd}: \text{MAO} \)

- \( \text{Bd} > 60\% \) of \( \text{MAO} \) \( \rightarrow \) \text{Gastrorena}ta

VIPoma

1. \( Q > 0 \)
2. \( \text{Old age} \)
3. \( 70\% \) \( \rightarrow \) \text{malignant potential}
4. \( \text{Present} \)

- \( \text{Pain} \)
- \( \text{Steatorrhea} \)

- \( \star \text{WDHA syndrome} / \text{Wermer Morision} / \text{Pancreate cholera} \)
- \( \text{WD} / \text{Watery Diarrhea} \)
- \( \text{H} / \text{Hyponatremia} \)
- \( \text{A} / \text{Alohydrea} + \text{acidosis} \)

\( \text{GILUCAGANO}MA \)

- \( \text{Present} \) \( \rightarrow \) \text{DM}

- \( \text{Anemia} \)
- \( \text{Stomatiti} \)
- \( \text{Dermatiti} \)

- \( \text{Thromboemboluer episodes} \)

- \( \text{Neurolytiti} \) \( \text{Migratory Erythema} \) \( \rightarrow \) \( \text{Kd} \) normal in

\( \text{Btw} \)
SOMATOSTATINOMA

1. Present in gallstone → cause stator DM → insulin

2. Common in MEN:
   VHL → cerebellar haemangioendo
cystic kidney
   RCC

   Inv.
   1. EUS →
   IOC for insulinoma
   CECT.

   Other tumour → SRS (Somatostatin Receptor
   Scintigraphy).

   - Octreotide Indium 111 → earlier use
   - Now, Pentetreotide - Indium 111

   MRI, PET scan not helpful.

   Tumour Marker -
   Chromogranin A

   Rx:
   - Octreotide - medical Rx
   - Radio Rx
   - Slightly Chemo (5) → Streptozocin + 5FU/Adriamycin
Head

Sx → Whipple's operation
L Pancreato-duodenectomy

Tail → Distal pancreatectomy.

Radical Sx are preferred in case of pancreas or tumor except Insuloma (enucleated)

If Insuloma
   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
   Q > 25
   T > 60 yrs

2) Arising in Head - microcystic.
   Bunch of grape appearance
   lined by cuboidal cells
- Glycogen +ve
  Mucin -ve

- Benign.

CT scan → Central Scar & Sun Burst Appearance

Rx:
1) Asymptomatic → Observation
2) Symptomatic → Central Pancreatectomy.

MUCINOUS CYSTADENOMA
- > 60 y/o
- Female

- Cystadenoma
  - Macrocyte
  - Microcyte

Read Body or Tail

- Ovary-like Stromal
- Estrogen Receptor
- Columnar cell → Mucin +ve
- Glycogen -ve

- Malignant potential

Tx → CEA +ve
CT Scan → Hypodense lesion, Internal septation, Wall calcification

Rx

Surgery:

IPMN (Tanaka classification)

\[ \text{"G > 0"} \]

- Old age
- Main duct
  - Intramural nodule

ERCP → ↑ Mucin

- Exocrine mucous column
- Out from ampulla
- Fish mouth appearance of ampulla

↑ Cancer → PIN (Pancreatic Intrapanethelial Neoplasia)

CEA / CA 19-9 ↑

Rx - Surgery

EXOCRINE Tx

Acinic Cell Tumour
  - Seen in serous gland tumour

- Schmid Triad
  1. Subcutaneous Nodule
  2. Polyarthralgia
  3. Hirsutism
ADENOCARCINOMA

- Old age ≥55yr
- Hered. Distribution → 70%
- 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 syndrome (FAMMM) → PCr → Chr 9. p. CDKN2A

3. Peutz-Jegher → Chr. 19. STK11/LKB1

4. Breast Ovary Syndrome, BRCA 1, BRCA 2

5. Ataxia- Telangiectasia → Chr 11. ATM

6. HNPCC, MSI, Better Prognos.
Apc gene \( \Rightarrow \) Peremptory Cancer

- Non-Familial
  - RAS \( \rightarrow \) 95-100%
  - p53 \( \rightarrow \) 75%
  - HER2/Neu

Presentation:
- General Symptom
  - Anorexia, wt. loss
- Jaundice
  - Palpable GB
  - Pain
  
  Back \( \rightarrow \) invaded splanchnic n\(\_\)h
  
  So \( \rightarrow \) inoperable Tx.

Courvoisier Law:
- Obstructive jaundice + Palpable GB \( \Rightarrow \) Malignancy.
- " + Impalpable GB \( \Rightarrow \) stone
  
  If there is obstructive jaundice + Palpable GB, it is not due to stone \( \Rightarrow \) Impede Cancer.

Exception to: Mucocele

\-[Double Impaction + Stone]-

CBD + Jaundice

Trouseau Syndrome
- Migratory thrombophlebitis
  
  Not pathognomonic
Tumour Markers:
CA 19-9 > 80%

Follow-up:

Roof top / Chavcron 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 T_x > 3cm

Tx out / fail
Be 

- Hypertonic duodenography
  - Wide C loop of duodenum
  - Mucosal irregularity → Rose thorn ing
  - Antecal Pad Sign
  - Reverse 3 sign of Frostberg

Rx - Radiotherapy

- Only 1 minor hole - along chemo neoadjuvant for downstaging

Chemotherapy →
- Gemcitabin → Capecitabin
  - 5-FU
  - Erbitux
  - Docetaxel

(2) Folinic acid - 5FU
- Irinotecan
- Oxaliplatin

Whipple's → Pancreaticoduodenectomy
  - Initially antrum was also removed
  - Now pylorus is preserved

Mod. Whipple / Pylorus Preserving pancreateoduodenectomy
  (Longmire & Traverso Operation)
WHIPPLE'S OPERATION

 McLennan's Whipple's - Roto Drainage Procedure

↑ Risk of Leak
Pancreas > Bile duct > Stomach

- If origin of artery (SMA) is involved → then operation is €
  if SMA
- If ≤ 1/2 circumference compressed then relative €. to see

Resectable Tx
Related to Pancreas &
no evidence of SMV or
portal vein involvement.
Palliative:

- Jaundice
  - >80% sometime done Pre-operatively when S. Bile is not.
  - Manage by Stenting by ERCP.
  - Method:
    - Stent used so that tumour doesn't compress
      - If not by ERCP then PTC.

  - b) Sx:
    - Cholecdochoduodenotomy
      - It has a tendency to get involved by Tx
      - Hence not preferred.
    - Cholecystojejunostomy
    - Roux-en-Y - Hepatice jejunostomy

27 [G.D.O.

20-30% cases.

- Metal Stents
  - Biodegradable
  - ERBD
  - duodenum
  - colon
3) Pain
   - Celiac Ganglion block
   - Splanchnic nerve block → Radio frequency Ablation
   \[ B/L, T_{12}-L_1 \]
   Complication:
   Early: Hypotension
   Late: Diarrhoea

   5-year survival for pancreas in operated case = 15%:
   Inoperable case = 5%

   SOLID PSEUDOPAPILLARY Tumor of Pancreas / FRANTZ Tumor
   \[ T \geq 10-30 \text{ year} \]
   \[ \frac{2}{3} \text{rd in Tail} \]
   - Encapsulated
   - Large: > 8 cm
   - Solid x Cystic composition - Central cystic - periphery - solid
   - Low grade Cancer
   - Metastasis < 15% → Liver (Blood - Bones)
- Apc, p. catenin +ve
- Progesterone receptor +ve
- Vimentin +ve
- NSE +ve
- S100 +ve

- CT scan - Solid + cystic component
- Haemorrhage necrosis

- Histology - Foamy macrophage
  - Cholesterol clefts
  - Hyaline granulomatous

- Rx surgery

**Acute Pancreatitis**

- Enzymes inside pancreas are inactive
- Activated in pancreas
- Autodigestion
- 1st enzyme - Phospholipase A
- Leithin \[\rightarrow\] Lysoleithin
OP1E Common channel theory -
Bile enters pancreas causing pancreatitis.
Bile enters pancreas causing pancreatitis.

Now, Pancreatitis pH > Bile pH

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

We see for pseudo-pancreatic cyst → Retropertitoneal?

Q. Why hemorrhage, pancreatitis?

Blood vessel contains elastic

Electrode is released in pancreatitis

Damage, vessel

Hemorrhage (Diaphragm to pelvis)
SIRS (Systemic Inflammatory Response Syndrome)

IL-2 (IL-6) IL-8 TNF, CAT-1

- Vasodilatation
- Endothelial damage

- Intravascular fluid goes to extra-vascular space

SIRS → Septicemia → Infection

Severe sepsis → Acidosis

- Organ failure → Lung/Heart/Kidney

Septicemia & shock

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 - HIC 75%
2) Alcohol
3) Idiopathic
4) Trauma - ERCP - HIC Comp - Pancreatitis
   Cholangitis
5) Metabolic
   Hypercholesterolemia
   Hyperlipoproteinemia - HIC not much
   Hypertriglyceridemia
   Hyperparathyroid
   CRF
   Hypercalcemia
6) Virus - CMV
   Mumps
   Coxsackie
7) Toxin - Methyl alcohol
   Ammonia - mushroom toxin
   Black + yellow venem
8) Drugs - GO
   Azathioprine
   6-mercaptopurine
   Pentamidine
   LS perginase
   Cytarabine arabinoside
   Fludarabine
   Thiopride
   Ne valproate
   Dilantin
   Zidovudine
   Steroid
   Metronidazol
   Etoside
   Doxycline, Tetr, etc.
   Trimethoprin
   Sulfemetaprazole
a) Tropical pancreatitis

H/t in Kerala

Diet - Carbohydrate/Taprose avoided

SPINK-1 mutation

10) Congenital Anomalies

Pancreatic Divisum

Incidence 10%.

11) Familial Type

Hereditary in place of Argentine

Tryptophan is altered in this type.

Presentation

1) Pain - epigastric region

Relieved by moving bending forward

2) Grey Turner's Sign

Deterioration in flank

3) Cullen's Sign

Deterioration of coloration around umbilicus

4) Fox Sign

Deterioration in inguinal canal

5. Amylase -> Early

Persistently high amylase = 50% Complication

Pseudocyst of Pancreas

Sensitivity - 80%
Alcoholism
Hypertriglyceridemia I amylase may reach 10x

Specificity - 80%

Causes of I. s. amylase
1) Parotitis
2) Boerhaave syndrome
3) P. Embolem
4) Duodenal perforation
5) Ac. cholecystitis
6) Ac. mesenteric ischemia
7) Dissecting Abdominal aneurysm of aorta
8) Twisted ovarian cyst
9) Ruptured ectopic
10) CRF
11) Cystic Fibrosis -> No malabsorption, only hem suster

Never ↑ in cardiac pathologies.

I amylase ⇒ No prognostic Role
> 3 times ⇒ Pancreatitis

2) I. Lipase

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

No prognostic significance
> 3 times ⇒ Pancreatitis
3) Urinary Amylase / Creatinine Ratio

- Obsolete now
- Ratio < 5
  - if > 15 \(\Rightarrow\) s/o Pancreatitis
  - Macrodysgenesis or pancreatitis - to differentiate

4) Urinary trypsinogen / Faecal Albumin

Radiology

1) Plain X-ray -
   - Sentinel loop
   - Colon Cuff off sign
   - Obscured Psoas Shadow
   - Pancreatic calcification
     - Seen in acute or chronic cases.
   - Pleural Effusion
     - Ground glass Appearance \(\Rightarrow\) Peritonitis.

2) USG - 1st inv.
   - Not a good modality for pancreas.
   - Collection can be seen
   - CBD / gall stone

3) CECT \(\rightarrow\) IOC
   - Most accurate
   - Changes - 22-18 mm
   - Necrosis > 72 mm
   - 0-10 score \(\Rightarrow\) Severe
Balohan Score
Based on inflammation, edema, collection.
0-4 scoring
1 - inflammation in pancreas
2 - inflammation outside pancreas
3 - per 2 organ ends
4 - many organs

CT Severity Index
after 72 hour - based on neuro

Prognosis
1) CRP →
If after 7 day >150 → inflammation continued
>150 → severe

2) Glasgow Score / Intensiv
>8 severe

3) Apache II (acute physiology & chronic health evaluation)
>8 severe
Mar. Score (72) → Head injury
Apache - III → Mar. 249
Apache - 0 → obesity
BMI > 35 → Poor prognosis

4) BISAP Score
For any acute abdomen or critical care
B - BUN
I - Impaired mental status
S - SIRS
A - Age < 60 yr.
       > 60yr.
P - Pleural effusion

5) Atlanta 2012
   Local Comp.  Organ Failure.
   Mild (0)

Mod. (+) but Transient < 48 hr.
Severe (+) Present Persistent, > 48 hr.

6) Ramsay's Score
   < 24 hr.  > 48 hr.
   Age > 755  Fluid loss > 6L
   TLC > 16,000 / mm³  Pao₂ < 60 mm Hg
   LDH > 350  Fall in Haematocrit > 10
   SGOT > 250  S. calcium < 8mg/dL
   Sugar < 200 mg/dL  B. urea > 5
   Base deficit > 4
   Score
   1-2 = 1%
   3-4 = 15%
   5-6 = 40%
   > 7 = 100%

1/3 \rightarrow SEVERE
Mod. Ranson → for GB unless.

1) Glasgow Score
   - APE
   - T/L/C △ ≥ 3 severe
   - L/D/S
   - S/GOT
   - S/Glu
   - S/O₂
   - S/Ca²⁺
   - S/albumin
   - B/Urea

   Glasgow > 3 L ≥ 24 h
   Apache II > 8

   Ranson’s > 7 L ≥ 48 h
   ATLANTA

   CT severity index ≥ 72 hours

Rx: critical care management
   - Fluid
   - O₂
   - Calcium
   - PPI
   - Nutrition
     - give orally, when tolerate orally
     - Analgesics → NSAID
     - Opoid: Meperidine, Buprenorphine
Antibiotics -
  * Methylprednisolone
  * Ofloxacin

Sympathetic nerve block - DOC

Oxycodone
Apexenem

Sy -
> ERCP -

only 1 indicator - Gall Stone Pancreatitis
Golden Period - 48hr

2) Infected Peripancreatic fluid collection
   Peripancreatic fluid collection → later peripancreatic pseudocyst
   Peripancreatic drainage

3) Pancreatic Abscess - Drain

4) Infected necrotizing pancreatitis
   Necrosectomy

5) Pseudopancreatic cyst
   Fibrous wall around peripancreatic fluid collection
   * seen in lesser sac
   * → x-ray
   * well mature in 6-8 weeks

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
Ac Pancreatic

M/c Pseudocyst in children → TRAUMA

Chronic Pancreatitis → Communicate to pancreatic duct

Trauma

- No epithelial lining
- Lined by granulation tissue

- M/c complication
  - Infection → fellow Haemorrhage

Inv CECT

Sx - Pre-Req

1) Size > 5cm
2) Duration > 6wk

Gen 8-12wk → M/c cyst → Haemorrhage from wall

Cysto-gastrostomy, Jurasz Procedure → TOG

If cyst is below Transverse Colon

→ Cysto-jejunostomy → lower recurrence

Only 1 indication → low lying cyst

Cysto-duodenostomy can also be done
DIGIDO CLASSIFICATION
- Pancreatic duct
- Communicating duct
- H/c vascular comp of pancreas → Spleen vein
- H/c arterial comp of pancreas → Spleen artery aneurysm

CHRONIC PANCREATITIS

Pathology:
1. Fibrosis
2. Calcification

C/E
- Pain
- Malabsorption
- DM

Sx has limited role.
8. Drainage can be done to drain the secretion.
it reduces pain, malabsorption.

Causes:
- Toxic & metabolic → H/c alcohol
- Idiopathic
- Genetic
- CFTR
- Autoimmune
- Recurrent acute
- Obstructed
Autoimmune Pancreatitis - or related
IgA4, RS/lesss (Immunoglobulin Related Systemic Disease)

HISORT
H - Histology
I - Imaging
S - Serology
T - T/t
R - Response to steroids

Histology - lymphoma plasma cell
Shorten phrase.

I - CT - sausage shaped pancreas
Delayed rim enhancement

E - ANA, Antichymotrypsin Ab.

Response to steroids.

Stellate cell accumulation in pancreas

Collagen deposition
Fibrosis

Inv.

I - Malabsorption
@ Steatorrhea
B) NBT-PABA test / Bentiomide test
l Nitro Blue Tetrazolium.
4) Endoscopy → look for enzyme deficient

5) Secretin:
   measure HrG in pancreatic juice

6) Lunch:
   Protein rich diet → pancreatic juice
   look for Trypsinogen

Radiology:

X-ray - Pancreatic calcification
   not preferred

USG - Not good

CTC → Pancreatic Peri-pancreatic calcification

CRCP → CHAIN OF LAKE APPEARANCE

MRCP → Secretin stimulation MRCP.

EUS →
   Rosemont Criteria
   Major:
   ① Echogenic shadow in pancreas → post-acid ulcer
   ② Stone in main duct

③ Grand lobation → honeycomb
Rx
Medical:
- Le Paige > 30,000 units.

Sx is only indicated when medical management fails.

When duct is not dilated → ERCP stenting.
- Duct dilated > 6mm

Divide ↓
- Cut the duct

Divide jejunal ↓

Longitudinal
Pancreatico-
Jejunostomy.

→ PUESTOW OPERATION

- Bagel
- Fiery's
- Divide when tail is involved
Beger, Duodenum preserving pancreas head resected

Frey's
Open the duct

Scoop out the contents
Similar to Peetmore operation

Pancreatic calculi are made up of CaCO₃
Submandibular gland stone
Excretory stone made up of Ca₃(PO₄)₂

MECKEL'S DIVERTICULUM

- Thyme 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:
- 2 in 2% population
- 2 inch long
- 2 feet or proximal to ICT
  - Male: female 2:1

- Ectopic tissue - Gastro (50%)
  - Pancreas
  - Jejunum or Colon

- 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) To Scan -> for parietal cell (Image)
  - To diagnose gastric rupture
  - No use if no ectopic tissue

  2) CECT
  - Stomach
  - Heckel's
  - Bladder
If incidentally found diverticula in laparotomy
- V narrow
- If mouth is narrow or ectopic 0 int  R  Remove it.
- If presentation is diverticula 0  No ectopic
- R → Diverticulectomy
- If ectopic tenuae present
  R → Resection + Anastomosis

---

Wedge resection

---

It should not be closed longitudinally → structure
It should be done transversely.

Ectopic Tenuae

[Diagram]
Intussusception

HCE - <2yr

Peyer's Patch Hypertrophy

as lead point

+ due to

- weaning
- lymphoma

>2yr -> HSP.

Palyv
Meckel's

Type
Ileal - H/C type (70%)
Ileo-ileal
Ileo-colic

Presentation
- Pain - intermittent
- Red mucous - Red current jelly stool

Exam
1) Empty @ ileae fossa - DANCE SIGN
2) Sausage or banana shaped lump
   due to concavity towards umbilicus
3) Prolapse
- **Inv. USG → Ba enema**
  - **USG → Target Sign**
  - **Daughter Sign**
  - **Pseudo kidney sign**

- **CECT → Most accurate**
  - **Bowel inside bowel (Aero-ideal)**

- **Ba enema →**
  - **Claw sign**
  - **Pincer shaped deformity**
  - **Cup shaped deformity**

- **CT Scan → Ying-Yang sign**

- If has therapeutic success of 70%.

- **Rx:**
  - **Exploratory laparotomy**
  - Reduce manually → squeeze out.
  - Never pull it off.
  - Look for lead point.

- **Gangrene → Relevent anatomy**

- 1 > 2 > 3
CARCINOID SYNDROME

Cells come from Kultschiky cells.

ECL

APUD cell (amide precursor uptake decarboxylation)

H/c system involved - GIT > Rep > Genitourinary

Midgut > Hindgut > Foregut

H/c site - Ileum > Rectum > Appendix.

Stomach → atrophic gastritis. 1 Benign

MEN-1

Sporadic - Cancer ±

Bronchial Carcinoid

90% Benign → Adenoma

10% Cancer - atypical

Chromogranin + ve

Serotonin - ve

Ki-67 ++

GIT → chemical Mediator

Liver 2

Metabolize

Valine → 5HIAA

(Hydroxy indole acetic acid)
In the liver when the liver is unable to produce chemical mediators, this occurs due to liver 2°.

- Pain
- Flushing
- Diarrhoea
- Hypertension
- Palpitation

Heart - Subendo cardiac fission

TR > TS > PS, Heart PR

Inv

- SRS (Somatotetin 2° sensitivity)

If

- MIBG (Meta-ido-Benyl Guanidines)
  - for Phaeochromocytoma

- CECT

Tumour, Hyper:

- Blood - Chromogranin A
- Urine - 5HIAA
Well | Mod. | Poorer
---|---|---
1) Histocinex | <2 | 2-20 | >20/Hpf
2) Ki67 | <3% | 3-20% | >20%
3) Neocrosis | absent | present | present
4) Pleomorphism | absent | present | present

Rx
Octreotide
2) Radio resistant
3) Chemotherapy - Streptozocin +5FU/Adriamycin
4) Sx - >2cm margin

Appendix

- <1cm
- 1-2cm
- >2cm

Appendectomy

One of tumour whether Liver 2.5 considered

Operable

Whipple

Palliative

1. Incidental Carcinoma
CELIAC DISEASE

Gluten Sensitive Enteropathy

White/Barley/Rye

Gluten (alcohol soluble part)

Irrain bowel

Int. villi, CD4+ T cell → Destroy villi

HLA DQ2 - 98%
HLA DQ8 - 2%

Presentation:

1) Malabsorption
2) Diarrhoea
3) Steatorrhoea

2) Dermatitis herpetiformis

Dx:

1) Serological:
   Anti TT4 (tissue transglutaminase)
   Anti-endomysial (IgA, IgG)

2) Biopsy:
   1) Lymphocyte infiltration
   2) Epithelial proliferation
   3) Villi atrophy
   4) Flat mucosa

3) Celiac Syndrome → Intramural celiacLECTO necrotic region
   CeliacLECTO sprue and deficiency
Rx: 1) Gluten free diet

**SHORT BOWEL SYNDROME**

**ICJ** - proximal < 18cm
Remaind < 200cm

Min length: adult > 60cm
Child > 40cm

Causal:

- Mesenteric Ischaemia
- Trauma
- TBI
- Volvulus

Children - athelia
Midgut volvulus

Newborns:

- Bowel length
- Villi length
- GLP-2

Presentation:

- Malabsorption
- Steatorrhea
- Upper Gastro Severe
- Gall Stone -> Cholelithiasis (Bile Salts)

Renal Stone -> Oxalate
Calcium bends to oxalate → absorption

In malabsorption → Ca²⁺ + Fat, so oxalate becomes free

Absorption ↑

Hyperoxaluria ↑

Oxalate stone

Rx

1. GLP-2
2. Glutamime

Sx - BIANCHI OPERATION

STEP (Serial Transverse Enteroplasty)

Intestinal Transplant

Mid-ileum (150cm)

Max Graft vs Host Disease

MESENTERIC CYST

Origin is from DJ to ileocolic junction

Chylo

1. Lymphatic - H/Lc
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 yr

Site - Abdomen

Loc - CECT

Tillaux Triad
1) Hid-abdominal cystic swelling
2) mobile at T to root of mesentry
3) there is a band of resonance in front of cyst

Rx: Chylolymphatic & Enucleation

Enterogenous → Excision of cyst + Reattachment of bowel

IPSID (Immuno proliferative Small intestinal Disease)
H/e presentation → Malabsorption
Associated: Campylobacter jejuni
H/e site → Duodenum > Jejunum
Ig → Truncated Heavy chain  
   NO Light chain

→ Heavy chain Disease  
   Translocation.

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

  Re- antibiotics  
      → if not responsive → then chemotherapy

MALROTATION

- Duodenum, J get fixed = 6-9 wks 90°

- Cæcum gets fixed in 2 planes:  
  1. 180° Rotation (9-12 wks)
  2. Incomplete rotation 270°  
     Anticlockwise

  Number 1mobile → non-rotation

  Number 2 mobile → non-rotation
(1) Non-rotation

\[ \rightarrow \text{Ladd's band obstruction} \]

\[ \text{2nd part of duodenum} \]

\[ \text{Bilious vomiting} \]

\[ \text{Caecum} \]

(2) Incomplete Rotation

\[ \rightarrow \text{due to mesentery} \]

\[ \text{Mesentery} \]

\[ \text{Present in life} \]

\[ \text{Swallow} \]

1) \[ \text{Ba meal followed by} \]

\[ \text{Cork screw appearance} \]

2) \[ \text{CT Scan} \]

\[ \text{Whirl sign appearance} \]

\[ \text{Rx - Ladd's Operation} \]

\[ \text{Division of Ladd's Band} \]

\[ \text{Widening of mesentery} \]

\[ \text{Prophylactic appendectomy} \]
Recurrent Rotation - Type of incomplete rotation.

Ant Dorsalum → anterior → colon (Part)

MECONIUM ILEUS

Seen in Cystic fibrosis - AR - CFTR

Presentation
1. Antenatal obstruction
   Perforation
   Cause chemical peritonitis

   - Intra-abdominal calcification
   - Snowstorm appearance on X-ray

2. Pseudozyst
3. Bowel structure atresia
4. Microcolon

Obstetrician → Meconium ileus

SOAP BUBBLE APPEARANCE (Neuhauer sign)

Rx - Meconium plug syndrome
   1. Hartmann enema - 2 attempt

Sx. Bishop koop operation.
INTERNAL HERNIA.

HLc.

1. **Paraduodenal Hernia**
   - Behind IMV, 4th of duodenum
   - Due to lifting of peritoneal fold, fossa of Landzert

2. **Paraduodenal Hernia**
   - Behind 3rd of duodenum
   - SMA

- Waldeyer's fossa

- Panvion Hernia

- Complication of Peux-en-Y or gastric bypass surgery

- Stammmer's
COLORECTAL CA

M/C Cancer in GIT
H/C of cancer death.

Site:
- Rectum > Sigmoid > Cacum
- in colon > sigmoid H/C.
  colorectal = rectum H/C.

- O
- > 55y.

Risk Factors:

Diet:
- Selenium Deficiency
  - tofu diet is protective, not correct now
  - animal fat is causative.

- UC -
  - >10yr, long seg. (beyond splenic flexure)
  - after 10yr, rise at 1% per year.
  - yearly colonoscopy is recommended

4. Cholecystectomy -> ↑ colon cancer (2 sided)

5. Familial:

Polyposis coli (Peutz Jeghers)

HNPCC

adenomatous Hamartomatous
ADENOMATOUS POLYP

FAP - AD

Gene - APC on 5q

2nd decade

Polyp no. ↑↑ age → by 55 yr. >100 Polyps

Cancer Risk - 100%

te 90 yr. pt develop cancer

Periampullary cancer

Spiegelman classification - depends on

- Histology
- No.
- Size
- Diploplea

Gardner's Syndrome -

1. Soft tissue tumour - Fibroma
   Osteoma - jaw, forehead
   Lipoma
   Sebaceous cyst
   Dermoid tumour

   Ant. Rectus sheath
   90°

   Malignant

   Wide excision

   Recurrent → Radiotherapy

2. Intra-abdominal
   Invasive
- Twecot's Syndrome - Polyp + CNS
  - Can be AD or AR
  - Medulloblastoma (APC)
    - Adult -> Glioblastoma Multiforme
      - HNPCC

**Type of Polyp**

- Tubular: 70%
- Tubovillous: 20%
- Villous: 10%

- Cancer Risk

**Haggett Classification**

- On basis of Depth
  - 0 - mucosa
  - 1 - head
  - 2 - neck
  - 3 - head
  - 4 - base

- Requires Sx

**Hamartomatous Polyp**

- AD & Poly-Poly-Syndrome
- Moderate Risk

- Chr 19
  - Poly - Site - Head > Tejumum > Duodenum > Colon
  - Cancer Risk in Pancreas, Breast, Lung

- Melanin deposition at musco-cutaneous rash
Ovary → Granulosa Cell Tumour
Testis → Sertoli Cell Tumour

COWDEN → LOW RISK
- CHK1, gene - PTEN
- Polyposis - cancer risk ↑
- → uterine leiomyoma
  → thyroid ca
  → breast ca
  → Facial Trichilemmoma - Benign intercell neoplasm

MUIR TORE → MODERATE RISK
- Breast cancer
  → Sebaceous adenoma

BANNYAN RAITLY RUVALCORA SYNDROME

NON-FAMILIAL

CRONKHITE CANADA SYNDROME - LOW RISK
- Throat mucosa
- Deep crepit
- Forehead hypertrophy
- → protein lost
  → Niel Dystrophy
  → Retodermal dysplasia
  → Skin Pigmentation
  → Alopecia
Juvenile Polyp / Rectal Polyp
- The cause of rectal bleeding in children
- Benign

Rectal Polyposis → RA 15%

Pseudopolypl → seen in UC
- Benign

HNPCC / Lynch

- Histology I
  - Colon Cancer
  - Stomach
  - Pancreas
  - Uterus 2nd m/c
  - Ovary
  - Skin
  - Urological

- More common R > L
- Prognosis - better

Amsterdam Criteria - Modified
- Age < 50 yrs
- 2 or more first degree family members having cancer in the same generation - 2 or more family members
- 2 should be 1st degree
**ONCOGENES.**

**Adenoma-Ca-sequence**

Fleiner & Vogelstein (1990)  | Microsatellite Instability
---|---
HPN Pe  | Mutmatch Repair

**APC (g) Deletion**

β Catenin up

WNT pathway

Cyclin D1

MYC

Normal → Aberrant expression

**Cox Inhibitor** → Reversal

**Early Adenoma**

\[ \downarrow \text{RAS(g)} \rightarrow \text{TGFβ} \]

**Intermediate Adenoma**

\[ \downarrow \text{BRAF} \]

**Late adenoma**

\[ p53, \text{chr}(17) \]

Carcinoma

**Nitrogen & NSAID (Cox-2) are protective**
- Exophytic \rightarrow lump
- Bleeding \rightarrow oozing
- Occult blood
- Anemia + RIF lump
- Rectal cancer \rightarrow bleeding, PR
- RIF + Br screen
- Deficiency anemia
- Crohn's

**Screening**

- Colon cancer
  - 5-year colonoscopy
  - Occult blood + stool - Guaiac Test
  - Bowel habit
  - ColoGuard - DNA analysis in cell
  - Immunochromel Test - Blood
Blood supply:

- **Marginal artery of Drummond Sudak**
- **Terminal**
- **Intermediate**
- **Paracolic**

H/c site of Ischaemia in colon → Spleenic Flexure

- **H/c**

Called **Griffith**

- **2nd → Sudak → Rectosigmoid junction**

L/N:

- **Epiolic** → on colon
- **Paracolic** → on marginal artery
- **Intermediate** → on Re, HC, LC IC
- **HAG** → Root of SMA (SMA)
1. Colonoscopy + Biopsy
   - Examine whole colon
   - Since 57% have multiple sites
   - Synchronous - ≤ 6 month
   - Metachronous - > 6 month

2. PET-CT for staging

3. Virtual colonoscopy
   - Air in colon → 3D CT
   - Only disadvantage - can't take Biopsy

Tumour Marker
CEA
   - glycoprotein
   - > 85% follow up
   - Rx - Immunoradiotherapy
   - anti CEA / I^{131}

Rectal CA
   - Ax + TRUS ( Trans Rectal Ultrasound)
   - for depth T staging
   - (node) in mesorectum

Endo Rectal MRI
   - for local anatomy - size & node
**Staging - DUKE Stage**

A - confined to mucosa
B₁ - in muscle
B₂ - outside muscle
C₁ - in muscle + LN.
C₂ - outside - LN.
D - metastatic

**Rx - Surgery**

A - Sₚ
B₁ - Sₚ → CT.
B₂ -
C₁ -
C₂ - CT → Sₚ → CT + RT

CT → Folfox → Folinic Acid (Leucovorin)
5 Fu
Oxaliplatin
- Cetuximab γ → Wild RAS + ve
- Panitumumab ʃ

- Bevacizumab for VEGR
$S \rightarrow (R) \rightarrow \text{R Hemicolecotomy}$

$\text{L} \rightarrow \text{L}$

$\text{R Extended Hemicolecotomy}$

$\text{R Hemicolecotomy}$

$\text{R Extended Hemicolecotomy}$
Liver 2° are considered operable in Colon Ca

Ekberg Criteria
- < 4 in no.
- B/L

Late → good prognosis.

Prognostic Indicator:
- L. Node

Metastatic Pot. → Depth

* Kohne Prognostic Classification
  - No. of metastatic loc.
  - WRC
  - Performance status

* Gercor Prognostic Classification:

CRS + HIPEC
(Cyto Reductive Surgery) + (Hyperthermic Intra-peritoneal Chemotherapy)

T/t of Peritoneal Ca (Carcinomatosis Peritonei)

So: R2 Resection
RECTAL CANCER

Rx
1. Transanal Excision (TEM)
2. Ant. Resection
3. APR. (Abdominal Perineal Resection) → MIIE’s operation

> Transanal Excision
- Size < 4 cm.
- Anal verge < 10 cm.
- Circumference < 40%
- T1a or T1, No.

2. Ant. Resection

APR

→ followed by "End Colostomy"
> 5.5 cm → Ant. Rectum → 5 cm → APR.
< 5 cm → APR
  > 5.5 cm → AR
  < 5 cm → APR

LA

> 3.5 cm AR
< 3 cm APR.

colocececal cell, painful
Dentate line
squamous cell, painful.

Total Mesorectal excision— Pre-sacral space
HEALD.

Mesorectum

Middle Sacral artery
content of pre-sacral space

→ recurrence

Contents of
- Fibrofatty tissue
- L.N.
- Inf. hypogastric plexus
- Sup. rectal artery

Remove mesorectum up to cotic artery
ANAL CANAL

Adeno ca

columnar

LA

Scc or epidermoid

To of Scc -> GT -> RT - NIGRO'S REGIME.
5 FU + Cetaplatin (cold team - Mitomy cca - c)

APPENDIX

M/c position - Retrocecal
Racet - Post- ileal

M/c

Pta-cecal
ilcoca
appendicular artery
accessory appendicular artery (artery of Sheehachalam)
Jackson membrane

Value of Gerlach. → at the appendicular surface, there is a mucous fold

APPENDICITIS

M/c of abd. emergency.

Type

Obstructive

Catastrophic

Ventral peritoneal T10

Anus → Umbilicus → McBurney's point → parietal peritoneum

Murphy's Tend

Pain → Vomiting

Temperature

Pain > Vomiting

McBurney's Point

At the junct of 2/3rd medial - 1/3rd lateral
- Dicullop's Triad
  - Gradering
  - Tenderness
  - Hyperesthesia

- Rovsing's Sign → Pain in RIF when pressure given at LIF

- Cope's Sign
  - In retrocaecal appendix
  - Extension of hip joint causes pain

- Obturator sign
  - Internal rotation of thigh causes pain

- Dumphey
  - Colitis causes pain

- Aaron Test -
  - Press at RIF causes pain in epigastrium

- Ten Hour Test -
  - O2 pull O2 tense down causes pain in RIF

- Bertedo -
  - Inflated colon ↑ air → Causes pain

- Addie Test -
  - To differentiate
Point of tenderness

change position

But no shift in tenderness in appendectomy

H
c D/D in children - Meconium Adenitis

Inv.

TLC ↑

DLC - polymorphs ↑
CRP ↑ - 100% - The predictor value

USG → IOC

 Tubular structure blend ending
 non compressible
 non penetrable

Length > 6cm , width > 6mm

Doppler → FLAME SIGN.

Prognostic Indicator

ALVARADO Score / MANTRELS Score

H Migratory pain - 1 Total - 10
A Anorexia - 1 y > 7 → appendicile
N N, V - 1 5-7 → CECT
T Tenderness - 2
R Rebound tenderness (0
E Elevated Temp. (1
L Leukocytosis - 2
Tzanakie

- Hypogastric - 4
- Rebound tenderness - 3
- Leucocytosis - 2
- USG +ve - 6

Total 15

RIPASA:

AIRS (Appendix Inflammatory Response Scoring)

1. Appendicitis

Rx appendicectomy → Appendicectomy

Delay > 3-4 days

Appendicular Lump

Conservative

OS (Obstein Sheren Regimen)

Pt. unstable

Discharge

> 6wks → Interval Appendicectomy
APPENDICULAR ABSCESS

1) Extraperitoneal drainage

Perforated Appendix → Exploratory laparotomy

APPENDICECTOMY

1) McBurney’s Incision
   ① Muscle splitting → Grid Iron incision
   ② Muscle cutting → Rutherford Horrison incision

Ilio-hypogastric N. may get damaged

③ Lang incision – Transverse incision

If base is gangrenous → Don’t crush the base
for ligature → Absorbable suture used

In case of Crohn’s Disease –
① Leave
Appendicitis → Base involved → Leave in place → Remove
MANEC tumour (Mixed adenocarcinoma + neuroendocrine).

Adenocarcinoma + neuroendocrine
730% 730%

Synaptophysin
Chromogranin

VOLVULUS.

Sigmoid → old age. Caecal

Counter clockwise young age

Ante clockwise

narrow pedicle, long base-Mesentry

Presentation-
- Pain
- Dilation
- Complete obstruction
- Recurrence
- Hyper-resonant

Gangrene → Peritonitis

X-Ray - Omega sign → R red
COFFEE BEAN
Ba
- Bird on prey sign

Flatus tube/Sigmoidoscope
↓
Try to derotate

Exploratory Laparotomy > Manual De-rotation
↓
Sigmoid resection

Gangrene → Resection + Hartman's procedure.

> 6wks
↓
Hartman's closure after bowel preparation

DIVERTICULOSIS

- Colon > Sigmoid

- Longitudinal muscle in colon, in pattern of 3, not all around.

- Nutrient artery
- Tinea
- Toughest layer → Submucosa
- Intercurrence Area
SMA → artery is bleed in Diverticulosis

• Diverticulosis comes out from inter tena area
• Diverticulosis > 50yr
• Presents = Bleeding

H.cc colon: Bleeding → Diverticulosis

• Haem colon: Bleeding → Diverticulosis
• H.cc Bleeding PR in India → Haeomorrhoids

Diverticulitis → Pain/Hemp. → (Gelatinous abdomen
• Perforation
• Int. fistula → H/c of fistula

H/c of fistula in young (<50) colon’s Diverticulitis
• GW (>50yr) → Diverticulosis

Inf

1) Barium Enema IOC
• Saw Tooth Appearance

Diverticulitis → CT Scan – Best Env

HINCHEN classification

I – Localized abscess
II – Distant
III – Perforant Peritonitis
IV – Feculent
Rx: OI → Drain abscess → Manage. Infection
   ↓
   Discharge after recovery
   ↓
   >6weeks → Resect disease part
   ↓
   Bowel preparation
   ↓
   Anastomosis.

II } → Laparotomy → Resect disease
III
IV
Hartman's procedure

Reversal after 6 weeks after
Bowel preparation

ANGIODYSPLASIA (Image)

- Degenerative Cond
- Involves Colon > Spleum
- Mucosal submucosal (Venous) → Bleed
  ↓ diluted tortuose
  2nd HCC of colon Bleed

May be associated as Hayde Syndrome

Efficiency of vWF Def
ADAMTS13 → destroy vWF factor
- Colonoscopy
- Rx: Colonoscopic coagulation.

\[ F \uparrow \quad \text{Mucosal pertilla.} \]
\[ \text{End} \]

- Loop.

- C is the earliest comp of ileostomy = Ischaemia
- Commonest = Skin excoriation
- Colostomy = Parastomal Hernia
- Mucosal prolapse

Parastomal Hernia is the M/c seen is loop colostomy

Most ideal site.
Hartmann's Procedure

Reversible process >6wks anatomically

If (L) colon -> I° closure not done
In case of if I° closure is done

Defunctioning colostomy done >6wks

Reversal

Diversion Colitis

Small intestine -> Glutamine is req for mucosa
Large bowel -> Bacteria -> req for viability

Carbohydrate -> Bacteria -> Short chain FA
in food (Butyrate)

Mucosal atrophy of bowel due to colostomy/ileostomy
No carbohydrate in the segment.

Re- Butyrate enema
Medication
Steroid enema

Neutropenic Enterocolitis (typhilitis) on chemotherapy

TLC < 1000
WBC < 500
Ileo-cecal jiles →

Inflammatory mucosa → Transmural

Gangrene

CT scan — thickening of caecum and ileum

Pneumatosis Intestinalis

1° → 2°

Submucosal
Suberosal

15%
85%

CODD & connective tissue

Require Rx

CT
HIRSCHSPRUNG'S DISEASE

Cong. Megacolon

- Aganglionosis
  - ganglion absent in Submucosa
  - Involve Rectosigmoid
  - Familial

Down's syndrome

\[ \text{MEN} \rightarrow \text{RET} \]

Piebaldism \rightarrow \text{pigmentation}

Central Hypo ventilation Syndrome

At Birth - Unable to pass meconium

- Delayed passage of meconium

Preexam \rightarrow \text{collapsed Rectum}

- No rectal ampulla
- Rectum gapes finger

There can be delayed presentation

- No faecal soiling
- Distended abdomen
- Tense shiny skin
- Dilated I Veins

Transverse Colectomy

IVU - BA study

[Diagram of dilated rectosigmoid with aganglionosis]
2. Manometry → Rectal pressure > Sigmoidal Pressure

3. Gold Std. Biopsy
   - full thickness
   - 1.5 cm above dentate line
   - Suction Biopsy
     → absence of ganglion
     elongated A/V
     hypertrophied A/V
     ↑ Ache

Rx
1. Swenson
   → Resection + anastomosis
2. Duenel
3. Soave
4. Georgeaton - lap. assisted - assisted

RECTAL PROLAPSE

Partial
- Complete
  < 4 cm
  > 4 cm
  Full thickness
  Circumferential young/old

Rx
- Rule out constipation, straining
- Perineal Approach
- Perineal Reposition
- Delorme
- Laxative
- Alternier
- Hemorrhoid excision
  - Girdler's ligation
  - Thiersch's wire

Website: http://mbbshelp.com
WhatsApp: http://mbbshelp.com/whatsapp
Rektopexy

Lap. Rektopexy

Laxt Hernurencie

In India

In Ant. Well's

In Lot- Our Lupego

SRUS → Solitary Rectal Ulcer Syndrome

Puborectalis

Prolapse of mucosa

Ulcer on ant. wall

Middle age

Ulcerated lesion on ant. wall

5-8 cm. above anal verge

due to non-relaxation of puborectal during defecation

leading to ant. wall prolapse through puborectalis (int. intussusception)

Presentation

Off. on bleeding P/L

Mucosa in stool

Incomplete defecation
4. Sigmoidoscopy

21. Defaecography

MRI

- Collagen in mucosa
- Abnormality
- Colitis cystica profunda
- Muscle of muscularis mucosae destroyed
HAEMORRHIOIDS

Submucosal bunch of venal

Internal
Above Dentate line

External
Below Dentate line

3 10 10 → 2, 3, 4 O'clock

Grade
I - Sessel
II - Rectal Pedunculated
come out during defecation +
goes back spontaneously

III - Rectal Pedunculated
Manual Reposition Required

IV - Bleeding
Thrombosed fist pele - pain

Diagnosis
- By proctoscopy

I - Conservative

II - Band ligation → Barron Band
Sclerotherapy

Gr II internal

III → 1 Haemorrhoidectomy
Open → Milligan Morgan
Closed → Ferguson
Stapled haemorrhoidectomy

Longa's

1.5 cm above dentate line

Cryotherapy

Leg N₂ → freeze → Pk

DUHAL (Doppler guided haemorrhoidal artery ligation)

Recto-anal Repair

Fissure-in-Anto

- Pain - 1/10
- 6am - 6pm clock
- Linear ulcer at mid-cutaneous junction

Rx - No Pk or proctoscopy

Setz Bath

Laxative

Analgesic

Ointment

Botox type

Ch. fenure → skin tag → sentinel pole

Ps - Fissurectomy

Sphincterotomy → Lord's dilatation

Lat. Sphincterotomy
FISTULA

H/C abscess → Peri-anal abscess.

Fistula → abscess rupture + perirectal

Internal/external fistula → H/C type

Low lying → below L.A.
High " → High Above L.A.

Dx → Bst + MRI

Multiple → Crohn's
Colloid Ca
TB
Le L.G.V

Rx - Low - Fistulotomy
High - Seton wiring

Goodall's Rule

\[ A \]
\[ B \]
\[ C \]
Surgery

General Surgery

SIRS (Systemic Inflammatory Response Syndrome)
It is the body's response to infection.
Coined for pneumonia but used for all Mediated by IL-1, IL-6, TNFα.

TLC < 4000 or > 12000 Q
or > 10% Band form in the smear.

RR > 20/min

pO₂ < 32 mmHg

Temp < 34°C or > 36°C

PR > 90/min [Can out the effect of β blockers] or inotropes.

Any 2 or criteria out of 4 met → SIRS

Sepsis
Defined as SIRS + Known Focus of Infection.

Severe sepsis = When sepsis → hypotension but it responds to fluids.

Sepsic shock = When sepsis → hypotension but doesn't respond to fluids.

MODS (Multi-organ Dysfunction Syndrome)
Defined as failure of ≥2 organ systems.
CAUSES OF POST OPERATIVE FEVER

Post-op Day I
1) M/c - Atelectasis - collapse of alveoli
2) intenive spirometer is given to pt.

Day II or III
1) M/c acquired Hospital infection → UTI
2) Thrombophlebitis (superficial)
   M/c cause → I.V. line insertion
3) Pneumonia

Day IV or II
1) M/c of hospital acquired infection in a
   Surgical pt. → SSI (surgical site infection)

   It is defined as "infe" at the operated
   site & can occur within 30 days of surgery.
   In case an implant is to be placed,
   any infection occurs within 1 year of surgery
   is considered SSI

2) DVT
   Pneumatic compression stocking is used for prevention.

Day VII
6th Day - Burst Abdomen or Abdominal Wound Dehiscence can occur.
   Serous fluid sign or Salmon sign
Emergency Management
- Urine bag laparostomy or Bogota Bag laparostomy.
  - Urine bag placed on the wound, sutured to skin.

Definitive Management
- Resuture the Rectus Sheath.

>VII Day
1) Intra-abdominal collection or intra-abdominal abscess.

Overall
- Ambulatory pt.
- Supine pt.
- Pelvis

Pelvis
- Hepato-Renal Pouch
- IOC ➔ CECT
- Management ➔ Pigtail Catheter Insertion.
  - Can be used in liver abscess also.
**TYPES OF WOUND**

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>% SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLEAN</td>
<td>clean incised wound</td>
<td>&lt;2%</td>
</tr>
<tr>
<td></td>
<td>Knee Replacement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uncomplicated Hernia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breast Sx except obicu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thyroid Sx</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CABG</td>
<td></td>
</tr>
<tr>
<td>CLEAN CONTAMINATED</td>
<td>G1/GUS when there is no inflammation</td>
<td>2-10%</td>
</tr>
<tr>
<td></td>
<td>Elective Cholecystectomy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot; Appendicectomy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removal of urinary stone when no UTI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bowel Sx in a prepared Bowel</td>
<td></td>
</tr>
<tr>
<td>CONTAMINATED</td>
<td>G1/GUS when there is inflammation</td>
<td>&gt;10%</td>
</tr>
<tr>
<td></td>
<td>Emergency Appendicectomy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot; Cholecystectomy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bowel Sx in unprepared Bowel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removal of urinary stone when UTI +</td>
<td></td>
</tr>
</tbody>
</table>
4 - Dirty
- Peritonitis
- All abscess
- Traumatic wound & has not been damaged ≥ 6hrs

Golden period for traumatic wound

Scoring Systems

Asepsic

Clean case & always 1st case in elective OT list

Wound

1° Intension

Suture

Better scar
Less contracture

2° Intension

Open

More granulation tissue

3° Intension / delayed 1° closure

We initially leave the wound open due to infection

Once infection subsided in 2-3 days

Re-suture the wound.
To Reduce Incidence of SSI

1) Handwashing
   - For 1st case of day - 3-5 minutes.
   - For every subsequent case - 2 mins is enough.
   - 3 areas where contamination is mingled:
     - Thumb
     - Tip of finger
     - Interdigital cleft

2) Best way to remove hair from an operative side is **Intraoperative clipping of hair**.
   Shaving or de-epilatory cream are associated to 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 - 4thrs

4) **Ideal O.T. Parameters.**

   **4 Zones**
   **PROTECTIVE** - Change rooms
   Transfer bay
   Pre & post of rooms
   ICU / PACU
CLEAN - connect protective zone to aseptic zone equipment store room maintenance workshop

ASEPTIC - OT

DISPOSAL - where you dispose all waste.

1. Proper zoning
2. Min. 10-15 air changes in an hour. Out of 6 at least 4 should be fresh air changes.
3. 50-60% Relative humidity
4. Temp - 21-23°C
5. Inside theater, we need to have positive pressure (2 mm Hg above atmospheric pressure)
6. Air should flow from non-sterile to sterile to less sterile area

PATIENT SAFETY

1. Communication errors is the cause of wrong side Sx

WHO surgical safety checklist

Sign-In
- Ward → OT
  1) Name
  2) MRD
  3) Consent written
  4) Site marking

Time-Out
- Before starting procedure
  1) Identify themselves
  2) Name

Sign Out
- Before skin closure
  1) Nurse
  2) Instrument
  3) Gauge (Radio-opaque line)
5. Prophylactic antibiotic given or not
6. Known allergies

8. Surgeon
   - Surgery
   - Expected time
   - Anticipated blood loss
   - Any non-routine steps
   - Equipment
   - Failure

4. Anaesthetist
   - Prophylactic antibiotic
   - Any allergy
   - Any non-routine step
   - For concern

3. Surgeon
   - Actual 5 x 10
   - Non-routine step

3. Anaesthetist
   - Actual blood loss
   - Any concerns

---

**Estimated Blood Loss**

One fist full of clot → 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.

Belly of blade → sharpest portion of blade.

12 No.

For suture removal.
IV LINES

- Orange 14
- Grey 16
- Green 16
- Pink 20
- Blue 22
- Yellow 24

Earlier ATLS guidelines: 
- 16 gauge cannula & Trauma pkg.

Latest ATLS guidelines: 
- 18 gauge cannula are sufficient

COMMON SURGICAL POSITIONS

1) SUPINE → HIC position - Laprotomy, Thyroid, Breast

2) Lithotomy → gynecoco → obs.
   - Haemorrhoid
   - Fissure
   - TURP

If proper padding is not provided. Common perineal nerve can be injured.

3) Lateral position / Kidney Position.
   - Thoracotomy
   - Pilolithotomy [removing stone from pelvis]
   - Nephrolithotomy
   - Excessive abduction of arm → Brachial Plexus injury
4) **Jack Knife - Knee-Elbow position**
   
   Because of positional asphyxia, this position is no longer used.
   
   Earlier used for haemorrhoid therapy.

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
   - Chance of air embolism is higher due to negative pressure
   
   Can also be used for Breast reconstruction.

7) **Neutral Position**
   
   Head End ——— Foot End

8) **Trendelenberg Position**
   
   Foot

   Head

   Used for operating Pelvis.

9) **Reverse Trendelenberg (RT)**
   
   Head

   Foot

   Used in lap. choleystectomy.
**Drawback** - Accumulation of gas beneath the dome of diaphragm.

**Institute the diaphragm**

② Shoulder top pack → I/V complication following lap angle.

**Energy Sources**

- Unipolar Cautery
- Bipolar Cautery

① Machine → **Tip** (BOVIE)

↓

Body (Cut/Coag)

↓

Exit through cautery pad on thigh.

③ 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 becaz it pulse through entire body can interfere w/ condu.
6) Because there is lateral dispersion of current in unipolar cautery, 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 up to 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 due to heat production.
- Can be used close to vital structures.
- Precise cut.
- Can cut through scarred tissue as well.

**Principles of Minimally Invasive Surgery**
- CO₂ is the gas used for creating pneumoperitoneum.
- No O₂ or air as they support combustion.
- Pressure to be maintained: 10-15 mmHg.

**Pneumoperitoneum**

**Open (Hasson)**
- Used in:
  - Pregnant
  - Abdominal adhesions

**Verres** (Image)
- Stop valve tent 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 so that bowel doesn't damage.
  - Spring loaded trocar needle

To confirm whether:
1. Inject 5-10cc of saline through needle.
   - Saline should go on freely if a try to aspirate = nothing
8. If u put a drop of saline it gets sucked in peritoneum

Put In Trocar

↓

Through Trocar instrument are put

* If bowel injury due to Trocar

↓

Convert into open surgery but keep Trocar in position

* Laparoscopic instrument -> Black throughout except tep

↓

For insulation ensure current only act at tep

* If there is break in insulation capacitance

↓

Current leak out through Trocar

↓

Burns abdominal wall

How to prevent

1. Maintain proper insulation
2. Use Plastic Trocar
Conventional lap → multiple ports.

5mm

② Hypochondral port
[held in hand of operating surgeon]

10mm Epigastric port [instrument held in hand of surgeon]

10mm infraumbilical port [camera]

② Lumbor
[Toothed grasper to hold A. B.]

held by assistant.

During lap choke, surgeon → person holding camera → both stand on one side.

SILS (Single incision laparoscopic Sx)
we use SILS port
multiple openings in it

15mm infraumbilical incision

SILS trocar is inserted

all instruments through this

NOTES (Natural orifice Transluminal endoscopic Sx)

Through [internal] → no orifice used.

- Bladder
- Oral cavity
- Rectum

Umbilicus has no hole
ROBOTIC SURGERY
DA-VINCI Robotic Sx

Robotic Sx

Advantages of Robotic Over Lap

1) 3D vision
2) More freedom of movement (7 degrees)
3) Better direction
4) Faster recovery
5) Tremor reduction

Disadvantages

1) Expensive
2) Longer learning curve
3) Loss of tactile feedback.
SUTURE

3 instruments req for skin suturing
Needle Holder
Toothed Forceps
Plain scissors

1. Square throw
   If crossed once
   1 square throw

2. Square throw = Reef knot / Square knot
   Secure knot
doesn't open up.

Grammy'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
1. Everted edge

Mattress suture required
(When ends get inverted)

Horizontal

Vertical

Same depth
Go deep to other
adjacent side
Side come back on
same line

Everted +
Superficially

Haemostat
(Least cut through tissue)
• **Subcuticular Suture**
  Skin has no mark.
  Suture are made from inside the edge.
  Best suture material → **MONOCRYL**

• **Aberdeen's Suture knot/Cobbler's Knot**
  Correct way of tying a continuous suture.
  Start with 1 thread.
  Left to 1 thread.

  ![Diagram of Aberdeen's Suture Knot]

• **Running 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.

Ideal distance bet'n 2
Sutures. = 2x.

Ideal distance bet'w betw 1
Lacerated end = x.

**SUTURE MATERIAL**

**MONOFILAMENT**

- Single
- Stronger memory as compared to braided.

\[ \text{Memory = tendency of suture to revert a knot} \]

- Open up easily
- So, use multiple sutures knots
- To ensure doesn't open-up

Monocryl
Nylon
PDS (Poly Dioxan).

**BRAIDED**

- Multiple threads intertwined
- Higher wound infection rate due to crevices.

Veveyl
Silk.
ABSORBABLE SUTURE MATERIALS

Natural
- Catgut: derived from gut of sheep or [submuca]
  undergoes proteolytic degradation
  hold the tissue for 3-5 days (tensile strength)
- Chroma Catgut
  hold tissue for 7-10 days
  hole of catgut in Sx hat
  we only for approximation of subcutaneous
  Catgut is originally 1st layer
  in 2 layer bowel anatomy
  but now replaced by Vicryl

Synthetic
- Mononyl
  - Biot for subcutaneous
  - Simple
- Vicryl / Poly glyactan
  - Purple
  - Braided
  - Dissolve in 60-90 days

Vicryl
- Rapide
- Dissolve in 10-12 days

Uses of Vicryl
1) S/x tissue
2) Bowel anastomosis
3) CBD
4) Bladder

PDS / Poly dioxone
- Dissolve in 180 days
- Hernioplasty
- used same as Vicryl
NON-ABSORBABLE SUTURE

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 → Syntheze Non-absorbable

Barbed Vicryl - No need to tie a knot as spikes are on it

Drawback - Painful
If it migrates, tissue will open up
STEEL SUTURES

- To close sternotomy incision.
- Shouldice repair — originally steel sutures were used.

SUTURE THICKNESS

<table>
<thead>
<tr>
<th>No.</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-0</td>
<td>Thickest</td>
</tr>
<tr>
<td>4-0</td>
<td>for skin, Mononyl used</td>
</tr>
</tbody>
</table>

For rectus sheath — No. 1 Prolene.

3. Bladder — 1st layer — Vicryl,
   2nd — Silk

Tendon — Nylon.

Cataract — 10-0 silk.
**SUTURE REMOVAL**

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**

- Swaged → 2/3 in
  - Where thread is attached.
  - Ideal place to hold needle - 1/3 in from swaged end
  - 2/3 in from pointed end.

**NEEDLE**

- Cutting / Reverse Cutting
  - Triangular
    - Apex - towards concavity
    - Apex - outward to concavity
  - Used for tough str. like skin.

**ROUND BODY**

- Rounded cross-section
- Used for delicate str.
  - Bowel
  - CBD
  - V. ureter
Q: Pt has undergone Bilat Abdomen

PU & Planning Vr & Bogota Laparostomy
c suture to be used

3-0 Round Body
Silk

2-0 Round Body
Nylon

3-0 Cutting
Nylon

8-0 Cutting
Vicryl

PRINCIPLES OF PLASTIC SURGERY

Langer's → 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.

KRAISSEL → Relaxed tension liner
1st to M's action

BORGES → For incision over the face
SKIN GRAFTING

- Any piece of tissue that doesn't have its own blood supply

SPLIT THICKNESS SKIN / THIERSCH GRAFTS

THIERSCH DONOR

1) M/e Donor Site
   - Thigh, followed by Buttock

2) Larger Donor Area

3) Can be harvested using a HUMBY's knife or electric Dermatome

- Petechial haemorrhages are seen as graft is raised [it means slight thickening]

4) Requires just dressing

5) Donor site can be used for grafting

6) Max duration for storage in Skin Bank: 2 weeks at 4°C

WOLFE'S GRAFT (full thickness)

- M/e site - Post-auricular
  - Supra or infra clavicular fossa

- Can be peeled through blade

- Requires suturing

- Can't be used again
7) Meeting is done

1. Surface area by 1.5 cm
2. Prevent fluid accumulation beneath graft

**Recipient**

2. Better survival rate
   1. More resistant to trauma
   2. Cosmetically better
      Better colour matching

Skin Graft survival by 3 method

1. Imbibition → last for 24 hour.
2. Incubation → for 1-3 days
3. Neovascularization → beyond 3 days

**Flaps**

*Random Flap*
- Flap is not based on named blood vessel
- Failure chance are high

1) V-Y Plasty
   - It causes elongation of wound
   - So, it is used for Post burn Contractures
Z Plasty

- Transposition of 2 flaps
- Cause elongation of wound
- Ideal $\leq 60^\circ \rightarrow 1.7$ times elongated of wound.

3. Rhomboid flap/Lindberg - used for Pilonidal sinus surgery

* AXIAL FLAP
  Rotated but based on a named NV
  M/c used flap for Head & Neck $\rightarrow$ Pectoralis Major
  Myocutaneous flap
  Based on Pectoral branch of Thoraco-acromial NV

Deltopectoral Flap
  Based on 2nd, 4th perforator of internal mammary artery
  Rotated laterally

Abbey Estlander
  Used for reconstruction of upper lip, angle of mouth
  Based on labial venule.

Lattuimaro Doric Flap $\rightarrow$ Elliptical incision.
  - Used for Breast reconstruction
  - Based on thoraco-dorsal venule
TRAM FLAP

1. Transverse Rectus Abdominis Myopectineal Flap
   Used for Breast Reconstruction
   Cutting elliptical incision followed by retractor H/s to rotate upward
   Based on sup. epigastric or inf. epigastric (axial)
   ↓
   If both vessels used
   (Supercharged TRAM)

Disadvantage → chance of abd. wall hernia ↑

* FREE FLAP
When we disconnect tissue from donor site &
carry out microvascular anastomosis at the
recipient side → 1/3rd a free flap

Prolene is used
eg. for mandibular reconstruction → free tubular graft
Based on Peroneal vessels.

Best flap for ANDY GRUMP DEFORMITY

Floor of mouth hangs when mandible recedes
Fourrum Flap → Based on Radial artery
DIEP Flap → Best Flap for Breast Reconstruction
- Deep Inferior Epigastric 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

- Venous Block
  - Warm
  - Congested
  - * Blood Flow

  * In both Cond → Flap appears oedematous
Surgical Nutrition

Basal Energy Expenditure (BEE)

1. Mild Trauma N → 0.20 kcal/kg/day
2. Mod. Trauma/Septic → 1.4
3. Sev. Septic → 1.8
4. Sev. Burn → 2.40 kcal/kg/day

Nutrition

Enteral ➔ Parenteral
Going through gut through venous

1. Physiological
2. Cheap
3. Maintain enterohepatic circulation
   Prevents cholestasis
4. Keep intestinal mucosal patency
5. Prevent translocation of gut bacteria
**ENTERAL NUTRITION**

Mouth

- If unable to eat
  - < 2-4 wks.
    - NG Tube/NJ Tube
  - Good gastric emptying → Nu
  - Poor gastric emptying → NJ

> 4 wks. or

Unable to insert NG/NJ tube

→ Feeding Gastrostomy

- Feeding Jejunostomy

- Risk of aspiration

STAMI

- Stab incision on bowel & tube
  - Diad - Peridrain leakage

WITZEL

- Keep tube on surface, create a tunnel, then insert into bowel
  - Let's leakage

PEG + Tracheostomy

- Only for gastrostomy
  - Percut. endoscopic gastrostomy
  - Upper GI endoscopy
  - Put it under ant. surface
  - Incise tissue at felt site

Push

Pull

Introducer
Complications of Enteral Feeding

1. Osmotic Diarrhoea
2. Tube Related Complications
   a) Block
   b) Migration
   c) Peristomal 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 severe pancreatitis
5. Short Bowel Syndrome

Def. Adult

<100 cm of CI in the presence of ICI

<150 cm of SI in the absence of ICI

Management:
1. Long term TPN
2. SI Transplant

Def. Children

<40 cm of SI in the presence of ICI

<60 cm of SI in the absence of ICI
3) Surgery

BIANCHI

- Open Bowel
- Split it into 2
- Roll over, anastomose
- Double the length

Disadvantages:
1) Luminal compromise
2) Blood supply compromise

STEP

Serial Transverse Enterocplasty

\[
\text{Transit time } T \\
\xrightarrow{\text{So more absorption.}}
\]

Disadvantages:
1) Luminal compromise
2) Blood supply compromise

TPN

\[
\xrightarrow{\text{Central Ven. Subclavian - H/L}}
\]

- 1-2 Lts/24 hrs
- Rest of the fluid Req - DNS/RL
- 40-50\% → Carbo.
- 30-35\% → FAT
- 15-20\% → Proteins
Trace elements + vitamins also present:

On the basis of carb. content

- Low-osmolar
- High-osmolar

Preferred in Pulmonary failure pt.
(less CO₂ formed from carb. metabolism)

Resp. quotient > 1

Feeding Regime

H/c overall → Hyperglycemia

1) Trace element Def
2) Vitamine Def
3) Bilirubin stasis

Cholestasis is imp. reason to hold TPN

Refeeding Syndrome

Chronic malnourished pt.

[catabolic]

→ Large quantity → Refeeding Syndrome of TPN

↓ Anabolism starts

Mg²⁺ → Required ≥ Cell.
P₄₀⁻ → Required inside cell

Energy → Insulin → K⁺
This leads to:
- Hypomagnesemia
- Hypophosphatemia
- Hypokalemia
- Fluid overload

Associated with arrhythmia & congestive heart failure.

### Shock & Trauma

#### Hypovolemic Shock

<table>
<thead>
<tr>
<th>Classes</th>
<th>I</th>
<th>II (Compensated)</th>
<th>III ( Decompensated)</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Blood vol lost</td>
<td>0 - 15%</td>
<td>15 - 30%</td>
<td>30 - 40%</td>
<td>&gt; 40%</td>
</tr>
<tr>
<td>Amount of Blood lost</td>
<td>400 - 500 mL</td>
<td>1 L</td>
<td>1.5 L</td>
<td>&gt; 2 L</td>
</tr>
</tbody>
</table>

#### Monitoring Parameters

- PR
- SBP
- DBP
- PP
- UO
- RR

### Mental Status
- Shivery
- Confused
- Comatose

### Management
- Oral eq. crystalloid:
- NS or RL
- 3:1 ratio
- IV crystalloid + colloid
- Control loss
- Massive BMT
- If trauma not mentioned
Blood Loss $\rightarrow$ Sympathetic system $\rightarrow$ Adrenaline $\rightarrow$ TPR $\uparrow$

Non-ad

$\uparrow$ Peripheral vascular resistance

$\rightarrow$ Cold extremities

$\uparrow$ Peripheral vascular resistance

LDBP $\uparrow$

SBP $\leftarrow$ adequate cardiac output

$\uparrow$ venous return

Warm ext. $\rightarrow$ $\uparrow$ resistance

Cold ext. $\rightarrow$ $\downarrow$ resistance

Compensated shock

Non-pneumatic anti-shock garment

1-6 no.

Reduce peripheral loss, perfusion

Shift blood towards heart

Best indicator of fluid resuscitation in shock L. Urine output

Best indicator to determine amount of blood required for resuscitation = CVP

Shock index

HR/ SBP

If $>0.9$ = higher mortality

Best modified shock index

Q. HR/ MAP

Better indicator
ROPE
HR/PR
q  > 3 → Pt. going into More chance of Pt. going into decompensated shock.

Massive Blood Transfusion
>10 units of blood /24 h or
Replace the entire circulating blood vol in 24 hours.

Comb:
1) Hyperkalemia → RBC lyse to release K⁺
2) Hypothermia.
3) Hypocalcemia
   Bezo (citrate anticoagulant) chelate Ca²⁺.
4) Coagulopathy
   Loss platelets ↓ clotting factors
   Leading cause of death in pt. in massive blood transfusion.

PrBC : FFP : Platelet = 1 : 1 : 1

Control Bleeding
1) Pressure
2) Patience
3) Packing
<table>
<thead>
<tr>
<th></th>
<th>Hypovolemic</th>
<th>Cardiogenic</th>
<th>Neurogenic [Spinal Cord Transsection]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP</td>
<td>↑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBP</td>
<td>↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVR</td>
<td>↑</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>JVP</td>
<td>↓</td>
<td>↑</td>
<td></td>
</tr>
</tbody>
</table>

Cardiogenic

Heart not working → ↓ CO → ↓ SBP

Less blood → Cold in periphery → Extremities → ↓ PVR

JVP ↑ due to backlep

Neurogenic

Sympathetic system inhibited

PR ↓ Vasodilation

Pooling of blood → ↓ Warm

PVR ↓

Overcirculation

↓ JVP

↓ CO

↓ SBP
Anaphylactic shock

↑
↓

↑
↓

↑
↓

↑
↓

↑
↓

↑
↓

↑

Septic Shock
Warm
↑
↓

Celad
↑
↓

↑
↓

↑

Mimic Bac. T.

Anaphylaxis

Histamine

↑
↓

Vasodilation.

Sympathetic system intact

PR ↑

Hyperdynamic circulation

PR ↑

CO ↑

In late phase of sepsis, bacterial toxins suppress the myocardium.

Cardiotoxic

↑

(Same as Cardiogenic)
TRAUMA

3 spikes of mortality

- Massive head injury
- Aortic transection

Cardiac Tamponade
Tension pneumothorax
Haemorrhage
Haemoperitoneum

1 hr → golden hour following trauma

TRIAGE
Done in case of mass casualty event

Red → Require immediate intervention
- Active bleeding vessel
- Tension pneumothorax
- Cardiac tamponade
- Haemorrhage
- Haemoperitoneum.

Yellow → Require admission & stabilization.
But intervention can be done latter.

eg. # shaft of femur
Green = Walking wounded pts.
minor laceration.
First aid + medication.

Black = Dead Bodies or Moribound

ATLS
In Trauma
ABCD

ATLS
1° Survey
ABCD +
Life threatening injuries
1. Cardiac Tamponade
   Pneumothorax
   Haemo Thorax
   Peritoneum.

2° Survey
Detailed survey
(look for all other injuries)
Back
LOG ROLL
5 people Required for effective log roll

BLS/ACLS
In Cardiac Ph.
CAB

AIRWAY
Cervical spine F/B airway
*Danger Sign s/o Cervical spine injury
1. Coma
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 open airway → ask the name ↓
  
  If speech → airway fine

1) Comatose pt.
2) Gcs < 8
3) Unable to speak
4) Sev. maxillo-facial trauma
5) Oesophago-tracheal Int

Common

But in pt. to sev. maxillo-facial injury, if attempt of
Oesophago-tracheal Int fail, do not attempt again

Sev. maxillo-facial injury

Emergency

Needle cricothyroidotomy

(options: local anaesthetic
Use cricothyroid mem.
T 11 no needle
Put tube

- 4-6mm tube
- 20 min [at CO2 stack, accumulate]

Avoided in children < 12yr
beq coz it can lead to subglottic stenosis
**BREATHING**
- Put pt. on Ventilation.
- Identify: Tension Pneumothorax Cardiac tamponade

**CIRCULATION**

**Emergency**

- Venous cut down

**Intraosseous Infusion**

- Great saphenous just below tibia

**Definitive**

- Venous infusion
- Intravenous cut down

**Central Line**

**M/C → IJV**

- Insert IJV
20yr old O\textsuperscript{2}, RTA\textsuperscript{2}, intubated \& rt at the accident 2hrs later brought to emergency. Spontaneously opening, clamping eyes, moving all 4 limbs.

\[ \text{Max.} \to 11T \quad [E_4 + M_6 + 1T] \]
Same pt. in emergency
③ Hand localize pain
⑤ Ab flxion
Motor Score? → ⑤ → Highest motor response noted

Mild – 13-15
Mod. – 9-12
Severe – <8

4/2110
ABDOMINAL TRAUMA

1) M/c organ injured in Blunt abdominal Trauma
   = Spleen
2) M/c organ injured in penetrating
   = LIVER > SI
3) γ. γ. Gun shot wound = SI

SEAT BELT SYNDROME
Abdominal organs get compressed between vertebral column & seat belt
M/c organ injured = MESENTERY

DECELERATION Injury
Mobile contents move forward, retroperitoneal
Organ stay there

\[ \text{Ileocecal Junction } \rightarrow \text{ DJ Flexure} \]
\[ \text{Ileocecal Junction} \]
Bowel Injuries

Longitudinal Injury Tear | Haemostasis
1 vessel gets injured but adjacent vessel also supplies the area

Hence, no loss of vascularity

Rx - only repair the tear

Transverse Injury Tear | Haemostasis
Vascularized in loop

BLUNT ABDOMINAL TRAUMA

Haemodynamically Stable

Fast

Loc

CECT

Fast - Focused Assessment Sonogram in Trauma
Advantage → Save time
2-4 min is required.
Probe - 4

Epigastrium
for cardiac tamponade

Hypochoondrium
Hypochoondrium
Suprapubic region
eFAST  
Extended FAST  
Probe - 4 + 2  
pleural cavity  
BOAST (Bedside organ assessment Sonography in Trauma)  
same as eFAST.

FAST  
any collee on FAST. (FAST +)  
Laparotomy [medline 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  
Gun shot wound is Breach x suture it  

If peritoneal Breach +  
Peritonitis  
Bile dressing of dressing  
omentum hanging out of wound  
Laparotomy.
Spleen

Splenic artery → Br. of Coeliac Trunk

C. ligament pedicle of spleen lies → lienorenal.
C. vessel are +t in gastrosplenic ligament → short gastric vessel.

Spleunculi – accessory splenic tissue

H/c site → Hilum of Spleen

Importance:
If this spleniculi is left behind when we are doing splenectomy for haematological cond.
It gives rise to recurrence.

H/c Benign Tumour → Haemangioma

H/c Malignant Tumour → Lymphoma

H/c True Cyst → Hydatid Cyst

H/c Cystic lesion → Pseudocyst (c can occur after injury)

Min. Platelet count required for Sx in a pt

1 lakh

Min. " " " " in a pd. of ITP

50,000
SPLENIC TRAUMA
Suspect splenic injury

- Bruising over lower chest (seen in splenic rupture)
- KEHR sign

If "march" of pt.
- all the blood will accumulate below the dome of diaphragm
- pt. will have shoulder tip pain.

GRADIENTS OF SPLENIC INJURY

I. Non-expanding subcapsular (10%)
   - Haematoma
     - 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 spleen pedicle

V. Shattered spleen


**I**

- Haemodynamic Stable
  - IOC
  - CECT
  - Conservative

  \[ \text{Serial CECT} \]

  \[ (12-24 \text{ hrs}) \]

  \[ \text{Monitor vitals} \]

  \[ \text{If grade of inj. 1 on CECT} \]

  \[ \text{angiographic embolisation} \]

  \[ \downarrow \]

  If it fails or

  If pt. becomes unstable or

  \[ \text{Contrast blush on CECT} \]

  \[ \downarrow \]

  Indications for Sx

  - Splenorrhaphy or splenic preservation

**II**

- If stable
  - By grade I + II

- If unstable
  - By grade III + IV

**III**
unstable

Ioc - FAST

Sx

Spleenectomy

Complications following Spleenectomy:

- Atelectasis or lower lung complications
- Haemorrhage
- Pancreatic Fistula
  [pancreatic tail is associated with hilum of spleen]
- Haematological change
  - Transient
    - Upto 2 weeks
    - WBC can be confused with infection
    - RBC
    - Platelets
      - Life > 10 lakh
  - Permanent
    - Howell Jolly Bodies
    - Basophilic stippling
    - Reticulocytosis
    - Hypersegmented Neutrophils

Indication for starting pt on prophylactic Aspirin.

OPSI (Opportunistic Post Splenectomy Ph)

- L. Causative: H/c Pneumococci
- H. Influenzae
- Meningococci

Children > adults
Usually occurs in 1st 2 yrs after splenectomy.
- More common when indication: Haematological
  Cond \( \Rightarrow \) Trauma
- ↑ mortality Rate
- Can be prevented by Vaccine.

**Vaccine**

**Elective**
2 weeks before

**Emergency**
Post-op Day 20-3

↑ Ab titre achieved before Sx.

**Pancreatico-Duodenal Trauma**

Rare

Penetrating Injury \( \rangle \) Blunt

- Isolated Duodenal Injury
- Isolated Pancreatic Injury
- Combined

- Duodenal Haematoma
  - Mx: Conservative
- Duodenal Perforation
  - Mx: Omental Patch Repair or Graham's Patch Repair

- Pancreatic Parenchymal Injury but no injury to duct

- Mx: Conservative. Abd. Trauma &
  Mlcs of pancreatitis.
  In children, adult - acute \( \rightarrow \) alcohol
  chronic \( \rightarrow \) Gallstone
2. Injury to H & N of Pancreas & Duct Disruption

BEGER
Duodenum preserving Pancreatic Head Resection.

3. Injury to distal pancreas & duct disruption

Mx - Distal Pancreaticoectomy

Combined Pancreatico-Duodenectomy Injury
Injury to H & N of Pancreas + Duct + Duodenum

Mx - Whipple [Pancreateo-duodenectomy]

BOWEL / COLONIC INJURY

SI injury

If pt. presents early
contamination
Stable

Operation + anastomosis

Late
contamination
Unstable

Stoma
Colonie Injury

Sigmoid colon.

If pt. t/nk early
↓ contamination stable
↓ Resection anastomosis

Rate presentation
↑ contamination
Unstable
↓ HARTMANN'S procedure

Once pt. stable
Anastomose after 6 wk.

Damage Control Sx / Abbreviated Laparotomy

Coagulopathy → Leading cause of death.

Hypothermia

Acidosis

A trauma pt. is suffering from the triad

⇒ Damage Control Sx

Phase I
Emergency Laparotomy
AIM
1) Stop bleeding
2) Prevent contamination.

Phase II
ICU Care
Temporary closure by Bogota bag

Phase III
Re-exploration
AIM
1) Correct anatomy
Retroperitoneal Trauma

Zone I - Include Major Blood Vessel associated with maximum mortality. All stab injuries to Zone I require exploration.

Zone II - Include Kidney & Ureter. IOC - Single shot IVU

If there is expanding haematoma + Non-visualization of kidney

Suspect Renal Vessel Injury
Do angiography then explore haematoma

Zone III - H/Rly injured zone
Majority can be managed conservatively

Pelvis, Bladder, Bone
THORACIC TRAUMA

Blunt

Tracheo Bronchial Injury

Penetrating

Haemothorax

(2. Pulmonary contusion)

RIB #

un common to have

1st Rib # → 10th - 12th Rib #

This requires high velocity impact

Suspect injury of
1) Subclavian V
2) Branchial Pleura
3) Apex of Lung

Simple Rib # - Mx adequate analgesia.
M/c Ribs # while doing CPR - 4th - 6th.

FLAIL & CHEST

# of >2 contiguous Rib at >2 places.

# Segment break hit lung = Underlying Pulmonary Contusion.

Some pts have Paradoxical Chest wall movement
multiple
Reb#

Leading cause of death - underlying pulmonary contusion, not the paradoxical movement.

Mx -
1) Adequate analgesia [Thoracic Epidural]
2) Despite - $pO_2 < 60 mmHg$
   \[ \text{RR} > 20/\text{min.} \]
   \[ \downarrow \]
   IPPV
   \[ \downarrow \]
   Despite - $pO_2 < 60$
   \[ \downarrow \]
   \[ \text{RR} > 20/\text{min.} \]
   Subclavian fixation.

**TENSION PNEUMOTHORAX**
- Can lead to rapid haemodynamic compromise
- Can occur in 3 situations:
  1) Sucking wound in chest wall
  2) Tracheal bronchial Injury
  3) Pulmonary laceration & air leak.
  IPPV interrupted, 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 ↑

Some features are seen in
Cardiac tamponade
- Percussion
- Hyper-resonance
- Breath sound: Θ
- Tension Pneumothorax
FAST is also useful to differentiate

Emergency

Needle thoracocentesis
Wide bore IV line in 2nd
IC space in mid clavicular
line

Definitive

Tube thoracocentesis
ICT in Δ of safety
we cover sucking around
gauze + tape it on 3
sides.

all can come out but
cannot enter.

flow is reversed by putting

[ tape of 3 sides

SIMPLE PNEUMOTHORAX

Do not cause haemodynamic compromise

Mx - Put in chest tube directly

If pneumothorax is involving 1/3rd of thoracic
cavity

HAEMOTHORAX

Accumulation of blood in pleural space
Dull percussion note  absence Breach sound

FAST is helpful modality

Mx - ICT insertion in Δ of safety

M/c site of aorta rupture in thoracic trauma
L attachment of ligamentum
arteriosum.
INDICATION OF THORACOTOMY IN HAEMOTHORAX

1) 1 L of blood loss at the time of insertion of ICT
2) > 200 cc/HR for 3 consecutive hrs
3) Unstable pt.

\[
\text{ICT} \quad \Delta \text{ of safety}
\]

Anti \rightarrow \text{ant. axillary fold} \quad (P. Major)
Post \rightarrow \text{post. axilla} \quad (Lattier, M. Dotui)
Apex \rightarrow \text{axilla}
Base \rightarrow 5^{th} ICS

- Chest tube is inserted along the upper border of lower rib, due to the neurovascular plane of lower border.
- Chest tube is connected to underwater seal

- Right Position

- Water level rises and falls with each breath.

- Correct position.

1-0 silk, cutting needle.

Correctly placed tube when all the holes/eyes of tube lies inside thoracic cavity \([x\text{-Ray}]\)
When column stops moving

Block tube  \[ \text{Displaced tube} \]

Excessive bubbling in column \( \Rightarrow \) formation of Bronchopleural fistula.

Check tube is removed when pt. is holding breath at peak of inspiration.

Q. Pt undergoes thoracotomy

ICT is inserted after dx
Serosanguinous fluid is coming out
When to remove \( \rightarrow \) when output is \( < 50-75cc/24 \text{hours} \)
\( \Rightarrow \) if the lung is expanded

\[ \text{CARDIAC TAMponade} \]
- Occurs 2° to penetrating injury

\( \geq 50cc \) blood \( \rightarrow \) cardiac tamponade.

Rapid accumulation of blood

\( \downarrow \) Puts pressure of heart

\( \downarrow \) Heart can't relax

\( \downarrow \) Diastole is not proper

\( \downarrow \) SV \( \rightarrow \) LCO \( \rightarrow \) HR \( \times \) systolic

\[ \text{BECK'S TRIAD} \]
- Hypotension
- \( \uparrow \) JVP
- Muffled Heart Sounds.

Dx \( \rightarrow \) by FAST.
Mx

Emergency

Needle Pericardiocentesis

Needle in subxiphoid area
45° to skin directed toward
① shoulder tip.

Done under ECG + Echo control

Loss of Pleuritic = Pericardial space

Aspirate blood.

H/c comp’- arrhythmia

STERNAL #

Uncommon

Required High Velocity Impact

If occur → give IVE to cardiac contusion

Monitor by 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 put Ryle's tube → end of Ryle's tube will be
Mx - Sx

By abdominal route

Involves reducing content & repairing diaphragm & prolene mesh.

NECK TRAUMA

3 ZONES

Zone I - Thoracic inlet to upper border of cricoid
Zone II - Cricoid to base of angle mandible
Zone III - Coj mandible to base of skull

I → Trachea + Major Veneol + Oesophagus associated → Max. mortality

II → Most exposed zone
Mostly injured zone
Most surgically accessible

III → Carotid Veneol +

Zone II Penetrating Injury

Majority
Superficial stable

Local exploration +
Suturing

10-15%
Deep to Platynum
Unstable

Formal neck exploration

* All Gun shot wound to neck require formal neck exploration
Layer

S - Skin

C - Connective tissue → Fibrinous tissue/scar.
   Blood vessels are adhered to this

A - Aponeurosis

L - Loose areolar tissue
   [Emisery vein]

P - Periosteum

- Scalp laceration bleed profusely as they can’t
  vasoconstrict due to adherence
- Control Bleeding
  1. Pressure
  2. Even the edges
- Cutting needle/so 1-0/2-0 silk nylon
  mattress sutures
- If there is bleeding below aponeurosis → Black eye
- Emisery vein carries retrograde infer to cavernous sinus infection
  Skull # → Depressed
  Non-Depressed
  Nothing to be done

Treat like open #
Surgical elevation is required
if focal neurological signs are present.
Skull Base

1. Ant. Skull # - cribiform plate
   C/F - @ CSF rhinorrhea
   2. Epistaxis

   B2 - transfusion @ in CSF

2. Black eyes / raccoon eyes

Black eyes are associated with subconjunctival haemorrhage if we cannot reach the posterior limit of sinus due to ant skull #.

4. Anosmia
5. Frontal lobe contusions

2. Middle cranial fossa # - petrous part of temporal bone

3. CSF aerotachoma
4. Haemotympanum
5. Battle sign - discolouration over mastoid process seen 24-48 hrs after middle cranial fossa #.

4. 7th N/v injury
5. Temporal lobe contusions
6. Paradoxical rhinorrhea - "collect in ME cavity through ET & causes rhinorrhea."
Cervical Spine Injury

1) Cervical spine injury should be suspected in all pts. with head injury.

2) GCS
   - 1st 2 hrs: every 30 mins.
   - Next 4 hrs: every hour.
   - After 6 hrs: every 2 hours.

3) Indications for involving neuro Sx:
   - GCS &lt; 8
   - Fall in GCS after admission
   - Unexplained confusion &gt; 4 hrs
   - Focal neurological signs
   - Seizures
   - 1 episode of vomiting
   - Loss of consciousness
   - ENT bleeding
   - Penetrating axe injury

NICE Guidelines
(National Institute of Clinical Excellence)

1) Cervical spine injury should be suspected in all pts. with head injury.

2) GCS
   - 1st 2 hrs: every 30 mins.
   - Next 4 hrs: every hour.
   - After 6 hrs: every 2 hours.

3) Indications for involving neuro Sx:
   - GCS &lt; 8
   - Fall in GCS after admission
   - Unexplained confusion &gt; 4 hrs
   - Focal neurological signs
   - Seizures
   - 1 episode of vomiting
   - Loss of consciousness
   - ENT bleeding
   - Penetrating axe injury

NICE Guidelines
(National Institute of Clinical Excellence)
4) Indications to do NCCT Head

L (Brain Head Injury

1. Scalp Gland stone
2. Renal Stone

a) GCS <13
b) if GCS fail to reach 15mm in 2 hours of admission.

Others are common.

**BRAIN INJURY**

<table>
<thead>
<tr>
<th>1st BRAIN INJURY</th>
<th>2nd BRAIN INJURY</th>
</tr>
</thead>
<tbody>
<tr>
<td>due to Impact</td>
<td>due to ICT</td>
</tr>
</tbody>
</table>

- Mildest: Concussion
  - Type: No intervention required

- Severe: Diffuse axonal injury
  - Shearing force between grey matter & white matter
  - Patient comatose
  - NCCT is N
  - IOC -> MRI
  - Punctate aHemorrhage at the grey & white matter

Worst Prognosis amongst head injuries
**INTRACRANIAL H’GE**

1. Contusion [Intraparenchymal] → No intervention required
2. EDH
3. SDH
4. SAH

M/c Traumatic Intracranial bleed → Contusion
M/c Intracranial Bleed → SAH

Traumatic SAH → rarely require sx intervention.
Spontaneous SAH → require sx

**EDH**

arterial
Middle Meningeal artery
young pt
High velocity impact

C/F - Lucid Interval - Period of return consciousness between episode of unconsciousness.

Common in EDH but not exclusive to EDH.

IOc → NCCT → Biconvex H’ge.

Mx - Burr Hole

**close to Pterion** → M shaped area where frontal, temporal, parietal sutures meet

... in temporal region.
Burr hole is made on side of pupillary dilation
if CT not available
if Burr hole not sufficient → craniotomy done to evacuate H'ge

SDH

Acute ↓ Subacute
(weeks) (days)

Chronic

elderly pts.
Trivial Trauma
Bridging Veins

Fall → gradual decline in mental sensorium.

IOC → NCCT → concavo convex H'ge / Crescente
Bet' Dura & Arachnoid.

There can be midline shift present as well
Mx - creation of Burr-Hole
If not sufficient → craniotomy

2° Brain Injury

↑ ICT

CPP = MAP - ICP

Ideal CPP → 60-70 mm Hg.

In Head Injury ICT ↑

So, to maintain CPP → MAP should be ↑

MAP ↑ → SBP ↑ → CO ↑ → HR x SV
Hence HR↑ will lead to ↓CO after some extent
So, SV need to ↑ → EDV↑

↑ Diastolic Interval

HR↓

Cushing's Reflex → Bradycardia
HTN altered Respiration

Variant of Cushing's Reflex → Hypotension is found instead of HTN.

Cushing's ulcer → Stress ulcer
seen in Head injury pts.
M/c Site → Acid Producing area of Stomach.

Cushing's ulcer are Stress ulcers seen in burn pts.
M/c Site → 1st part of Duodenum.

How to ↓ Raised ICT in Head Injury
1. Null pt. in 30° head up position
3. ↑ O₂
4. Avoid dextrose containing fluids.
   ↓ hypotonic ⇒ worsen cerebral edema.
5) Mannitol (IV)
6) Hyperventilation
8) **Steroids** → No role in Malaria ICH due to trauma

But: **Doe in Vasogenic Cerebral Edema**

15 Days

1. Notes x 4.
2. 1st Reading → 3 days
3. CRxE questions
4. Last 5 yr questions
5. Images

**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 → % of burn
**AIRWAY**

Danger Signs →
1) Carbonaceous deposit on sputum
2) Singed / Burned nasal hair
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]

Valvulation

↑ Evaporation

Vessels become leaky [upto 24hr after Burn]

Albumin Leak to Extra Vascular space

More fluid into EVS

3rd Space Loss. Seen in Burns

Do not use cold.

For resuscitation in 1st 24hr. in BURN pt.
If child > 10% BSA  |  →  circulatory shock.
    adult > 15% BSA

**PARKLAND FORMULA**

\[ \text{Amount of fluid in mL Required in 24hr of Burns} = 4 \times Bw(kg) \times TBSA burnt \]

1. 1st and 2nd Degree Burns are excluded from the calculation.

2. Max. value we use in this formula is 50%.

   otherwise fluid overload.

3. Time start when the pt get Burnt not when he come to the hospital.

   Total Amount

   \[ \frac{1}{2} \]

   1st 8hr

   \[ \frac{1}{2} \]

   next 16hr

   2x Bw x TBSA

   2x Bw x TBSA

Best Indicator of fluid resuscitation → U.O.

In adults:

\[ UO > 0.5-1 \text{ mL kg}^{-1} \text{ hr}^{-1} \] in BURNS

In child:

\[ UO > 1-1.5 \text{ mL kg}^{-1} \text{ hr}^{-1} \]
Calculation of BSA Burn:

1. PALM - 1%
   This method is simple but crude method to calculate patchy burns.

2. Wallace Rule of 9
   ADULTS

   9% A = 18%
   18% P = 18%
   9%

   CHILDREN

   18%
   9% A = 16%
   18% P = 18%
   9%
   1%
   27%

3. LUND & BROWDER CHART
   Best Method
   even for children → Best
ZONES

1. Zone of Coagulation
   Max. Injured zone
   Irreversible damage to the area.

2. Zone of Stasis
   Degradation or Necrosis Tissue
   If properly managed → can be recovered
   If it becomes infected → it can proceed to zone of coagulation

3. Zone of Hyperemia
   Becoz of vasodilation
   This zone usually recovers

DEGREE OF BURN

1st D → involve Epidermis
Burnt area red, tender
Complete Blanclching occurs on pressure
Healed Tott scarring in 3-5 days.

2nd D →

Superficial
involves epidermis + Papillary dermis

- Red
- Tender
- Blanclching

BLISTER FORMATION
forms in hours (1-2)
SCALD

Deep
E + entire Dermis
[Papillary + Reticular]

- Red
- Tender
- Some areas of fixed capillary
  Staining
2° Burn heal by Hypertrophic Scar
Keloid Formation.

Mx: Dressing using special material.
M/c used = Silver Sulphadiazine
Liquid action against Pseudomonas.
But doesn't penetrate Eschar.

2) Silver Nitrate
   Frequent application are required
   Stains everything Black.

3) Mafenide Acetate
   Can penetrate Eschar
   Application is painful
   in some pts, can cause metabolic acidosis.

4) Best Agent = Silver Nitrate
   Immuno modulatory action
   Can penetrate eschar
   Expensive

3° & 4° Degree Burns
↓
S/c → M/s

Tissue

Burnt area - Black
Charred
No Blanching
Painless → Below n/s get burned

Mx: Early excision followed by split thickness grafting
Mloc o' Death in Burns

1) Immediate → Asphyxia
2) Early (1-4 days) → Hypovolemic Shock
3) Late (>4-5 days) → Septic Shock
4) OVERALL → Septic Shock

H/CO | organisms in infect Burn pt → Pseudomonas.

Circumferential Burns

Circumferential Eschar
Fibrodot
\[ COMPARTMENT SYNDROME. \]

\( M_x - \) escharotomy \[ \rightarrow \] [fasciotomy [upto Deep Fascia]]

Electrical Burns - Ac output

High Degree Burns
Burns due to Ac → induce Tetany

Difficult for pt. to leave the source
Giveicine to

1) Acetylmime → leading cause of death.

Look for entry & exit Burns

Chemical Burns
Either Burn off compound or wash the area & water
never try to neutralize chemical burn.

\( \) exothermic reaction → worsen Burn
VASCULAR SURGERY

DVT

occur 2° Vīchow's Triad

R/F

1. Prolong immobilisation
2. Previous H/o DVT
3. Trauma
4. any sx lasting for >1HR exp → LL Pelvic Gynaec Urological

5. Ø

6. Malignancy
7. Protein c ± deficiency
8. May Thurner Syndrome – Iliac artery crossed over iliac vein

Plegmasia Cerulea Dolens – Painful Blue limb.
All major axial veins of L thrombosed but collateral are spared

Plegmasia Alba Dolens –
Painful White limb if all major axial veins + collateral involved

Usually seen during Ø.
C/E
1) H/c Feature - Limb Edema
2) Earliest - Pain

Only theoretical
Moses (murus & pain above)
Squeezing of calf
Pain.

Homans
If Dorsiflexion of foot
Pain

acute - anechoic

Doppler or Duplex Scan.
Chronic - echogenic

H/C veins affected by DVT → Calf or Soleal veins.
H/C veins from C DVT can give rise to Pulmonary embolism → Ileofemoral veins.

Mx -
1) Anticoagulation.
   1st 5 days → Heparin + Warfarin
   After 5 days → Warfarin

   1st Episode of DVT → 3 months Warfarin
   Recurrent DVT → lifelong Warfarin.

   \[ \frac{\text{INR}}{\text{PTp}} \rightarrow \text{Target INR} = 2-3 \quad \text{for DVT} \]
   \[ \quad \text{for Mech. Heart Valve} = 2.5-3.5 \]

Max. possible INR at which SA can be done w/o risk of excessive bleeding → (1.4)

INR → 1-2. If INR > 1.4 ⇒ Risk of excessive bleeding
   give FFP before SA.
Indications of IVC filter in DVT

1. PT & DVT but e/i for anticoagulant

**VARICOSE VEIN**
- Dilated, Tortuous Vein & Defective Valves

Valves ensure unidirectional flow of blood

GSV
- Medial end of dorsal v. arch.
- Ant. to MM
- Medial aspect of knee
- Sapheno-femoral J
- [4 cm below lateral to constant pubic tubercle]
- Below knee joint it is associated to saphenous n/v
- So not stripping in this area

SSV
- Lateral end of dorsal v. arch
- Sapheno-popliteal J (variable)
- All along its course, associated to saphenous n/v

No stripping of short saphenous vein.
Both systems are connected by perforators (100-150)

\[ \text{Direction from } S \to D \]

1. Largest perforator: Saphenofemoral
2. Thigh: Hunterian
3. Below knee: Boyd
4. 3 socket perforators: \( \left\{ \begin{array}{c}
5 \\
10 \\
15
\end{array} \right. \text{ cm above M.M.} \\
\]
5. At ankle: May Kuster perforator

\[ \text{O/E} \]
1. Dilated tortuous Vein
2. O/E - if diameter of vein \( \geq 4 \text{mm} \) \( \Rightarrow \) Varicose Vein
   \( 1-4 \text{mm} \) \( \Rightarrow \) Reticular Vein
   \( < 1 \text{mm} \) \( \Rightarrow \) Thread Vein or Dermal Flares.

**Test**
1. Trendelenburg
   - If SFJ is incompetent or not
   - If perforator completed or not
2. Fegam method - site of incompetent perforator
3. Mod. Perthe's - if DVT is present or not

\[ \text{DVT is C/I for Varicose Vein. Sx.} \]

All clinical tests have low sensitivity
So, IOC \( \Rightarrow \) Duplex Scan.
Great Saphenous Vein + SPJ incompetence

Traditional
- Trendelenburg
- (Flush ligation of SPJ)

Tie this vein otherwise recurrence

Only ligation
No stripping

Stripping is an additional procedure
Can be done up to knee

Latest: EVLT (Endovenous Laser Therapy)

TRIVEX

Subcutaneous illuminator
Dilated vein become visible
Hook out the vein + ligate
FOAM sclerotherapy

We use for thread veins or dermal plexus

Sclerosing Agents

1) Polydextrose
2) Ethanolamine oleate
3) Sodium tetradecyl sulfate
4) Sodium Morrhuate

Can also be used for rhinophyma, Varicose or Haemorrhoids

3:1. Tessari's technique

Air Sclerosant

COMPLICATIONS OF SURGERY

1) Hæmorrhage
2) Haemorrhage
3) Femoral vein damage
4) Artery damage

COMPLICATIONS OF VARICOSE VEIN

1) Bleeding
2) Calcification
3) Pigmentation - due to haemosiderin pigmentation
4) Lepodermatosclerotic - fat go away
   skin - shiny or thickened

5) Varicose ulcer
   1. Medial malleolus
      Garter area of leg
   2. Venous ulcer is shallow
      Sloping edge
      Pale granulation tissue @ floor

Inverted
Champagne
Bottle appearance
Pigmented Margins

Most acceptable theory behind development of venous ulcer - Ambulatory Venous HTN theory

Fibrin cuff
Leucocyte sequestration - No longer applicable theory

Mx of venous ulcer & using Bigard Regime

- Education
- Elevation of limb
- Plastic compression stockings
  - Grade III - pressure: 30-40mmHg
- Regular dressings
- Sx

Sx for varicose vein prevent recurrence of ulcers

Long standing venous ulcer $\Rightarrow$ Malignant Change
[Marjolin's Ulcer]

\[ \text{SCC} \]

ACUTE ARTERIAL OCCLUSION

- Due to embolus
- Since it is acute phenomena, there is no time for formation of collateral
- Pt. presents as BP - Pain, Pallor, Pulse, Paraesthesia
Pulicreations
Poikilothermia

IO c - Colour Doppler/Duplex Scan

Mx

4 pt presents early [6-8hr] - carry out
Embolectomy

Fogarty's Balloon used.

4 pt presents late when gangrene has set in
Amputation

CHRONIC ARTERIAL OCCLUSION

2° Thrombus
- Gradual progress
- Hence, formation of collaterals
  takes place ↓
  contribute to distal run-off seen in chr. arterial
  occlusion.
  portion distal to obtur packaged
  survive.

When pt walks - experience Pain of Claudication
  depend upon site of occlusion
  not always calf

As the thrombus ↑ in size, Distance of Claudication ↓
Gradually pt develop Rest Pain.
Leiath Syndrome
Thrombus @ bifurcation of aorta

(gluteal claudication)  Impotence in O°

IUC → Colour Doppler / Duplex Scan.

ABPI (Ankle Brachial Pressure Index)

\[
\text{Ankle SBP} > 1.1 \iff \text{calcified vessel [CKD, DM]}. \\
\]  
\[
0.9 \iff \text{Intermittent Claudication} \\
0.4 \iff \text{Critical Limb Ischaemia} \\
\]

below this, gangrene develops.

<table>
<thead>
<tr>
<th>Buerger or Thromboangiitis Obliterans</th>
<th>Atherosclerosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>S^k</td>
</tr>
<tr>
<td>O° &gt; Φ</td>
<td>O° = Φ</td>
</tr>
<tr>
<td>Smoking - R/F</td>
<td>Arteries Predominantly</td>
</tr>
<tr>
<td>Involve AVN</td>
<td>Proximal to Distal Spread</td>
</tr>
<tr>
<td>Distal to proximal spread</td>
<td>Large to Medium Vene</td>
</tr>
<tr>
<td>Small to medium vessels</td>
<td>Hy - Bypass Grafting</td>
</tr>
<tr>
<td>Bcocy size of venuel is narraow</td>
<td>Stenting</td>
</tr>
<tr>
<td>&amp; Bypass Grafting Stenting Can't be done</td>
<td>Best Natural Graft Saphenous Vein</td>
</tr>
<tr>
<td>Hy - conservative amputation</td>
<td>Best Synthetic → Dacron</td>
</tr>
</tbody>
</table>
Lumbar Sympathectomy can provide symptomatic relief from pain for few months, but it should only be done when there is REST PAIN due to intermittent claudication.

**Precaution:**
When doing B/L Lumbar Sympathectomy, the L1 ganglion should be saved on 1 side otherwise ft. will have problem in ejaculation.

Lumbar sympathetic chain can be confused with Genitofemoral N.

**ANEURYSMS**

- H/c Vena Envolved in Mycotic aneurysm

**H/c Venal Envolved in**

- Circle of Willis
- Infrarenal abdominal aorta
- Popliteal

**Aortic Aneurysm**

- H/c RF → Atherosclerosis
- H/c Site: Infrarenal abdom. aorta

**Screening** → USG Abd
If > 5.5 cm diameter ⇒ chance of rupture ↑
80% asymptomatic abd. acute aneurysm need to be operated.

Critical Diameter
Asc. → 5.5
Dec. → 6.5

C/F →
1) Abd. Pain
2) Pulsatile
3) Complication – rupture emboli to LL

IOC + CT Angiography
Management → SURGERY
all asymptomatic
asymptomatic > 5.5 cm
DACRON GRAFT REPAIR

Open EVAR
(Endovascular aneurysm repair)

1) Medial Visceral Rotation
   L. mobilize Colon medially
   MATTOX PROCEDURE Aorta → mat
   IVC → cat
Medical Visceral Rotation

Exposure IVC - CATTLEBRASCH Maneuver

Mobilisation of duodenum → KOCKERISATION

Complications of Sx

1. Hi'ge
   • 

3. Renal failure
4. Colonic ischaemia → G side of colon
5. Paraparesis → due to involvement of ADAMKIEWICZ Artery
   • 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

E/F:
1. Earliest → Chest Pain radiating to back [Intercostal region]
2. Once it occurs → hypotension occurs
3. If coronary sinus involved → MI can occur

IOC in Stable Pt → CT Angiography

Unstable Pt → TE Echo
**Raynaud's Phenomena**

Occur due to Vasospasm

- **Phase I** → Artery spasm \(\Rightarrow\) WHITE
- **Phase II** → Artery relaxes, vein spasm \(\Rightarrow\) BLUE
  - painfull
- **Phase III** → Artery, vein \(\Rightarrow\) RED
  - both relax

**Doc** → CCB

**A-V Fistula**

- **Congenital** - Klippel Trenaunay Syndrome
  - AV fistula
  - Varicose vein
  - Haemangioma
- **Iatrogenic** - M/C
  - Loss of deep venous system
- **Traumatic** - For Dialysis - Cimmino
Cong AV fistula are high output state
If INT in a limb ⇒ lead to Hypertrophy of Limb

Branham/Nicoladni Sign
↓ press feeding venel of fistula
↓ size of fistula
↓ PR↓
↓ CO↓
↓ SBP↓
↓ thrill over fistula

Ioc - CT Angio

Mx - Only Symptomatic require
  EMBOLISATION
  or
  LIGATION
BREAST

- LIE OVER PECTORALIS MAJOR
- MODIFIED SEBACEOUS SWEAT GLAND

- Lactiferous Duct

Ligaments of Cooper fascia attach to skin of breast superiorly.

15-20 Lactiferous duct open at nipple

If Lactiferous

If Ligament of Cooper involved ⇒ Puckering/Dimpling

If Lactiferous Duct ⇒ Retraction.

If Dimpling + Retraction +URT ⇒ Do not signify skin involved.

Retraction

Circumferential

Malignancy

Slit-like

Duct ectasia
Peau D'orange → occurs due to involvement of subdermal lymphatics.

↓ 10% signifies skin involvement

Lymphatic drainage

90% Axillary

10% Internal mammary

3 Levels Surgically
P. Minor Divide axilla

Lateral Medial

Rotter's LN → Interpectoral LN → Lie in Level I

TRIPLE ASSESSMENT

History & PE  Radiological [Initial]

FNAC  - True-cut biopsy /

HPE  - Excisional biopsy

1st Inv.

> 40 ym

< 40 ym

USG  - Mammograms

Dense Breast Tissue

In Dense Breast tissue → mammogram is not sensitive.
Mammography

Screening

Best

> 45 yrs

↓ mortality due to Breast Ca

4 cancer screening ↓ mortality

1) Breast
2) Cervix
3) Prostate
4) Colon.

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
BIRADS - Prostate
TIRADS - Thyroid

Type

Diagnostee

Mammography is usually done in 1st half of menstrual cycle so that it won't affect the embryo of the pt.

Clusters microcalcifications in mammography indicate maximum risk of malignancy.
<table>
<thead>
<tr>
<th>Type</th>
<th>Interpretation</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Incomplete</td>
<td>get alternate imaging test</td>
</tr>
<tr>
<td>1</td>
<td>Negative</td>
<td>1 yr for annual test</td>
</tr>
<tr>
<td>2</td>
<td>Benign</td>
<td>1 yr follow up</td>
</tr>
<tr>
<td>3</td>
<td>Probably Benign</td>
<td>short term follow up</td>
</tr>
<tr>
<td></td>
<td>[&lt;2% risk for Ca]</td>
<td>come back after 6 months</td>
</tr>
<tr>
<td>4</td>
<td>Suspicious</td>
<td>Biopsy</td>
</tr>
<tr>
<td></td>
<td>A - Low risk 2-10% risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B - Mod. 10-50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C - High 50-90%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Probably Malignant (&gt;95% risk)</td>
<td>Biopsy</td>
</tr>
<tr>
<td>6</td>
<td>Biopsy: Proven Malignancy</td>
<td></td>
</tr>
</tbody>
</table>

Microcalcification 90% - Malignancy

USG
No radiation exposure
10c in @
Best Inv. to differentiate solid vs cystic lesions
P: Malignant Breast Lump appears hypoechoic on USG
MRI

Indications

1) Breast Implants
   - Lenguini Sign → Intracapsular rupture of implant

2) To identify multifocal multi-centric breast lumps - IOC
   - Multifocal
   - Multicentric

3) Approved as a screening modality in young, high-risk pts. → (2) family H/o BRCA mutation

4) Sensitive Inv. to detect Scar Recurrence after mastectomy or Breast Conservation

5) Most sensitive Inv for DCIS

6) In a pt. with suspected ductal lesion where USG is inconclusive.

HPE

FNAC
- Size of needle = 23-30 gauge needle.
- In Breast lesions, it can’t Diff bet. In situ invasive cancer.
- Reception can’t be done

IOC ⇒ True-cut biopsy or Core Needle Biopsy [Image]
- Size of needle = 8-18 gauge
  - [16G] → Best Biopsy for Breast
Incidental Biopsy

Excisional Biopsy → Gold Std. Technique.

**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 with premenopausal Ca
  7) +ve Family History
    i) 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 < 20 yrs → protective.
    - if > 30 yrs → ↑ Risk of Breast Cancer
 11) Breast feeding → protective
    provided cumulative duration of Breast feeding > 1yr
H/c Gene mutated in Br. Ca \(\rightarrow\) p53

H/c Gene + Familial Br. Ca \(\rightarrow\) BRCA I.

85-90\% Br. Ca is sporadic, gene mutated in p53.

**BRCA mutation**

\[ \text{HBOC Syndrome} \]

**BRCA I**

Chr. 17

Predispose to

Breast

Ovarian

1st peritoneal

Colorectal

Pancreatic

Male Br. Cancer.

\[ \text{II} > \text{I} \]

Basal Subtype

Aggressive

Poor Prognosis

H/c histopathological type of BRCA I \(\Rightarrow\) Medullary

**BRCA 22**

Chr. 13

Predispose to

Breast

Ovarian

1st peritoneal

Colorectal

Male Br. Cancer

Prostate Ca

Luminal subtype

Better prognosis

HBOC Syndrome

II

Genetic Counseling

Genetic Test (BRCA)

Mutation +
Lifestyle changes -
- "Wt. reduce"
- Regular exercise
- Give up alcohol & smoking
- MRI Screening

Risk Reduction Techniques
1) B/l prophylactic mastectomy [195% - BRCA]
   OVCA - 10%]
2) B/l salpingo-oophorectomy [OVCA - 190%]
   Ideal age after completion of family 10% fallopian stump ca.
   < 40yrs of age [BRCA - 150%]
3) Tamoxifen [SERM].
   BRCA by 40%

IHC (Immunohistochemistry)

ER, PR

ALRED Score
0-8
Nuclear Brown - Nuclear []
L ER + PR+
Membrane Stained Brown

HER2 neu

HER2 neu

0 - Negative
1+ - equivocal [FISH]
2+ - Positive

Fluorescent In-situ Hybridization
amplified - non-amplified

Trastuzumab [Herceptin]
Molecular Subtypes of BRCA

Gene Expression Profiling

ER  PR  HER2

Luminal A (+) (+) (−)

Luminal B (+) (+) (+)

Basal (−) (−) (−)

Ki67 proliferation index

Low 1 (<14%) how quickly

TNBC Paradox (Triple Neg. BRCA)

This tumour responds very well to Anthracycline Based Chemo.

But after 1-5-2yrs, tends to relapse.

HER2 Neo enriched

Since development of Trastuzumab → prognosis of HER2Neo (+) ↑
IOC → True cut Biopsy
IOC for staging → PET scan.
CTNM → clinical
PTNM → pathological
MTNM → multiple tumour
ETNM → recurrent tumour
QTNM → TNM staging done after neo-adjuvent therapy

TNM

T0 - No tumour
Tis - In situ cancer
DCIS
Paget's Disease
AJCC - LCSI has been removed as in situ lesion.

T1 - ≤ 2cm
T2 - >2cm but <5cm
T3 - >5cm.
T4 -

A) Involvement of chest wall
B) Skin
   • peau d'orange
   • ulceration
   • satellite nodule
C) Inflammatory Br. Ca.
   • Wurt
D) Prognosis.
**N₀ - No**

**N₁ - Mobile ax L.N.**

**N₂**

A → fixed, matted L.N.  
B → trace of internal mammary L.N. in absence of axillary L.N.

**N₃**

A → infraclavicular L.N.  
B → internal mammary ⊕ Axillary L.N.  
C → supra clavicular L.N.

**M₀ - no met**

**M₁ - distant met**

Site of distant met -> Bone, Vertebral Column, [BATSON PLEXUS]  
Spinal [OSTEOBLASTIC > OSTEOCLASTIC]

**Mₙ**

Surgery, Chemo, RT, HT

---

**Sx**

1º Tumour  
LN

**BCS**

Mastectomy

**Overall survival**

NSABP  
EORTC  
MILAN

**Regional recurrence**

3-4%  
1%
RT is mandatory in Bcs. to ↓ recurrence.

**BCS**

Lumpectomy
Removing Tx ± 1cm margin.

<table>
<thead>
<tr>
<th>Margin status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bcs - 1cm</td>
</tr>
<tr>
<td>2cm</td>
</tr>
</tbody>
</table>

**Relative**

1. Oral cavity
2. Penile
3. Urethra
4. Rectum
5. Gastric adenocarcinoma (proximal margin)

**Technical C/I**

1. Multicentric (absolute)
2. Multifocal (relative)
3. Lobular Ca ± multicentric
4. Large Tx to Breast Ratio (relative)

**Family H/o & (f) ve axillary L.N. is not a C/I.**

**Mastectomy**

**Radical**
- Halsted
- Breast
- P. Major + Minor
- Level I, II, III L.N.

**Modified Radical Mastectomy**
- Incl. elliptical Stewart
- Removed
  1. Breast
  2. Nipple areola complex
  3. Pector fascia + P. Minor
  4. Level I, II, III L.N.
Boundaries of axillary Diner:
- 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. MIL - SEROMA → collect of fluid below flap. drains are put to 1 seroma formation.
When to remove drain → output < 50 cc/day for 2 consecutive days.

2. Inj. to h'ge

3. Injury to n/v
   - Long Thorac. [N to Serratus Ant.]
     ↓ 3 Br. from roots (C5, C6, C7)
     Inj to this n/v causes winging of scapula.
   - Thoracodorsal → Latissimus dorsi
   - Lat & Med Pectoral → Pectoralis major
   - Interco to brachial N/v
     → altered sensation in inner aspect of arm.
Lymphoedema

Post mastectomy lymphoedema - M/C CO; U:\ 107 lymphoedema

M/c of LL lymphoedema \ Filariasis
Incidence 2-10%.

Long standing lymphoedema \ Pt. can develop Angiosarcoma

Stewart Treve Syndrome

Local Recurrence

Extensive Cancer \n
Carcinoma

involves chest wall \nlike \narmour.

Sentinal L.N. Biopsy

1st draining L.N. from cancer is sentinal L.N.

1st cancer in this concept was designed \ Penile

Surgeon - CABANA

Other CA

1. Malignant melanoma
2. Breast
3. Penile
4. Vical
5. Endometrical
Indication in Br Ca

Clinically No axilla

While operating → found Sentinel L.N.

Send for Frozen section analysis.

\[
\text{[\text{in } 1/2 \text{ hr } \rightarrow + \text{ for cancer}]}\]

\[\text{ Sentinel L.N. } \downarrow \]

\[\text{ axillary L.N. direct. } \downarrow \text{ no need to clear axilla.} \]

\[\text{ Chance of Lymphoedema } \downarrow \]

\[
\text{Methods}
\]

Blue dye

Methylene Blue or

Isosulphan Blue

\[\text{1-1.5 cc of dye in peri-areolar region} \]

\[\text{Blue L.N. are Sentinel}

M/c Comp → skin tattooing

Best → combination of both

Hot & Blue L.N. → Sentinel L.N.

M/c N/V injected in Sentinel L.N. Biopsy ⇒ ICBN

Sentinel technique → inject \( \text{Fe}_2\text{O}_3 \) compound.
CHEMOTHERAPY

Indications:
1) TNBC (Triple Neg Br Ca)
2) HER 2 New + tumour
3) + L.N.
4) T_x \geq 1cm in Size

\[
\begin{array}{c|c|c}
T_1 & N_0 & M_0 \\
T_2 & & \\
\end{array}
\]

→ exception

Molecular Tests to determine whether chemo will be helpful or not

Done in Oncotype DX

\[
\begin{array}{c|c|c|c|c|c}
T_1 & N_0 & M_0 & ER & PR & +ve \\
T_2 & & & & & \\
\end{array}
\]

MAMMAPRINT

Done in.

\[
\begin{array}{c|c|c|c|c|c}
T_1 & N_0 & M_0 & ER & PR & +ve \\
T_2 & & & & & \\
\end{array}
\]

TAILOR X < Trial 21 gene assay

MINDACT 70 gene assay

Recurrence Score:

\[
\begin{align*}
< 18 & \Rightarrow \text{skip chemo} \\
18 - 31 & \Rightarrow \text{equivocal} \\
\geq 31 & \Rightarrow \text{chemo should be given.}
\end{align*}
\]
PAM 50 → 50 gene away
ENDOPREDICT → 8 gene

If BRCA p+ > 70%w ⇒ avoid Chemo.
Latest Chemo Regime
4AC F/B 4T

4 cycles of 3 weekly
- Adriamycin
- Cyclophosphamide

S/E
- Haematological: Cytopenia
- Metabolite: Acrinine
- MESNA is used for prevention

CAF

CMF = SFU:
- Methotrexate

Hercepton → Her 2 Neu+
(Trastuzumab) for 1yr

Palbociclib → CDK 4/6 inhibitor: ER/PR+ HER 2 Neu-
- Cytogen dependent kinase
- Metastatic Breast Cancer
RT

Indications:
1) + L.N.
2) after BCS
3) LABC [locally advanced Br. Ca]
4) 

HT

↓
ER/PR +

Premenopausal
Tamoxifen

NSABP Syr

ATLAS [10yr.]

H/c S/E → hot flushes
endometrial hyperplasia
DVT

Early Br. Cancer →

T1 | No | Mo | Surgery → BCS +
T2 | or | N1 | RT [mandatory]

Post-menopausal
AI (aromatase inhibitors)
Anastrozole
Letrozole
Exemestane

L, S/E → osteoporosis
Molecular Testing (N₁) +

Chemo

Locally Advanced Br. Ca

Any T₄ | M₀ → T₃ N₁ M₀

Any N₂

Any N₃

NACT → MRM → RT → ½ ER, PR ⊕ HT

Metastatic Br. Ca

M₁

Only Palliative T/t

Most Imp. Prognostic factor → axillary L.N. stated.

H/I Prog. factor in Metastatic cancer → ER/PR status

Special Situations

Male Breast Cancer

Incidence 1%

P/F

BRCA II > I

Klinefelter's Syndrome

Liver Disease

Dx, Mx, Staging, Prognosis exactly same as female Breast Cancer
Pregnancy associated Br. Ca
1. it develops during 6th or 7th yr of delivery
aggressive
poor prognosis
Dx - by True cut Biopsy
Imag-ing → USG.
Sx → 
Bcs & c/I → Hysterectomy
if pt is detected in IIIrd Trimester
Bcs can be done.
RT will be given after delivery

Chemo
safest Trimester → IInd Trimester

RT + HT
C/I in all trimesters.

Pathology of Breast Cancer
M/c quadrant → Upper outer
Least common' → Inner lower
M/c pathological Type → Infiltrating Ductal Ca,
not otherwise specified
(IDC, NOS).

Special type of ICD
Tubular
Medullary
BRCA1

Best prognosis
Mucinous
Infiltrating Lobular Ca
Single file/ Indian file pattern

OS Mutations to look at to differentiate IDC, ILC
E-Cadherin mutated in Lobular cancer

DCIS
4 Type
Papillary
Cuboidal
Solid
Comedo

H/Ic + microlcifications on mammogram
ER/PR (+)

Dx - True cut Biopsy

Mx - Surgery
Simple Mastectomy + Sentinel LNB

Bcs +
Sentinal LNB Biopsy
+ RT (mandatory)

No role of Chemo in situ cancer.

HT if pt. is ER/PR (+)
EIC → Extensive Intraductal Component
Invasive Tx - if > 25% & formed by DCIS ⇒ EIC
↓
Poor Prognostic Feature

Van Nuys Scoring

| for DCIS |
| Age | Type | Size |
| Margen Status |

Benign Breast Conditions

Breast Abscess
Lactating &
Carvative → S. aureus.
Source - Oropharynx of baby

B/CF - Pain
Fever
Lump

Dx - USG

Mx - at least 2 attempts of USG guided aspiration

If fail ↓
then I + D
D/D of non-healing B/C: Axilla -
1. Breast TB
2. Inflammatory B/Ca

ANZI

15-25 yr → Fibroadenoma
25-40 yr → Fibroadenosis
>40yr → Fibroadenosis > Duct Ectasia

FIBROADENOMA
→ H/L C of lump in breast

→ 15 yrs

Pathology

Pericanalicular
HARD Type

Intracanalicular
SOFT Type

Clinicopathological

C/F present:

firm mobile lump

Breast Mouse

Dx - Popcorn calcification in mammogram
1-2% HLC of malignancy are:

Indications for Sx:
1. Family History
2. Rapid ↑ in size
(3) Pt. having pain on
(4) axillary tenderness.

Giant fibroadenoma \( \Rightarrow \) > 5 cm

**MASTALGIA**

- **Cyclical**
  - Fibroadenosis
    - Age 25-40yrs
    - Pain max. before period
    - As period starts, pain ↑

Dx - USG

Hx - Lifestyle changes
- Avoid caffeine, chocolate

- Vit E capsule
- Premarin oil capsules

If pt. doesn't respond for 2 months ↓

Low dose TAMOXIFEN.

- **Non-Cyclical**

Musculo-skeletal causes.

1. **Tietze Syndrome**
   - Osteochondritis.
   - Mx - Intralateral Tcromonholone.

   Also used in keloids
   - Oral Submucocutaneous

2. **Mondor's Disease**
   - Sup. thrombophlebitis of chest vein
   - Hc ven \( \Rightarrow \) Lateral thoracic ven.
**NIPPLE D/C**

- **Single duct**
  - Serous → 
    - Prepuberty, Ca
  - Milky → Lactating, Prolactin ↑
  - Greenish → Duct ectasia.
- Bloody → Single Duct Papilloma
  - M/C: Cancer.

**DUCT PAPILLOMA**

- M/C of Bloody D/C from Single duct
- 10% → Associated with DCIS
- Dx: USG - Dilated duct + intraductal lesion
  - If inconclusive:
    - MRI
- Mx: Microdochectomy → removal of single duct + lump.

**DUCT ECTASIA**

- Perimenopausal women
- More common in smokers
- Duct remains dilated
  - Stasis of secretions
  - Perioductal mastitis [ZUSKA'S DISEASE]
Bleakh/greenish
Nipple D/c

Periareolar abcess or
Senea formation

Mx - antibiotics
   Rule out cancer
   Because multiple ducts are involved
   ↓
   HAD FIELD's Cone Excision

Paget's
   "Eczema like Cond" in e
   there is dermu of
   nipple-areola complex
   • Usually U/L
   • Dx - Bunch Biopsy of
     nipple [Image]
     [Inciional Bx technique]
     ↓
   Paget cell in the epidermis.
   • Large polygonal cells &
     a clear cytoplasm &
     prominent nucleoli
   • CEA +
     → Colorectal ca
     Medullary thyroid.
     70% → Underlying Lump
     DCIS → Infiltrating ductal ca

Eczema
   No Destruc of Nac.
   B/L
   No underlying lump.
Hx of underlying lump

Mx

Topical Steroids

**TRANSPANT**

Organ to be transported in UW (University of Wisconsin) solution → ALAG

Conductant:

ADENOSINE → energy

LACTOBIONASE → stabilizer

ALLOPURINOL → Free Radical scavenger

GLUTATHIONE

Cold Ischaemia → Max. Time for a Organ survive in solution.

Heart → 4 hrs

Lung → 6-8 hrs

Liver → 10-12 hrs

Kidney → 24-36 hrs

**RENAI TRANSPLANT**

**Indications**

**Adults**

H/t - CKD

2° DM

**Donor**

1. Donor kidney preferred because it has longer vein.

**Tests**

1. ABO

2. HLA

Most imp.
3 KFT
4 USG KUB
5 Renal Isotope Scan
   DMSA
   ↓
   DTPA
   ↓
   MAG 3

for structural

Total GFR →
Differential GFR → (2) → (3) contribution of each kidney

EXPANDED DONOR CRITERIA
1 Fit pt >60yrs can donate
2 Age >50yrs + 2 or more of the following:
   - H/o HTN
   - S. creatinine >1.5
   - death due to a stroke.

RECIPIENT
Kidney is kept in iliac fossa.

3 Anastomosis
1 Renal artery → iliac artery
   prolene
2 " vein → iliac v.
3 Ureter → bladder
   - Vicryl or PDS.
COMPLICATIONS

1) Rejection

- Hyperacute
  - due to pre-formed antibodies
  - Type II HSN Real

- Acute
  - T cell type of transplant
  - because of immunological cause

- Chronic
  - Delayed Rejec
  - Type IV HSN

- MHC type of rejection

Can be treated by effective immunosuppression

> 90% 1 year survival rate

2) Risk of infection
3) MHC Organism - CMV
4) MHC Cancer in transplanted ft - Skin Cancer
5) PTLD (post-transplant lympho-proliferative disorder)
6) due to EBV

5) MHC of mortality - CVS cancer
LIVER TRANSPLANT

- Orthotopic
- Remove DS Liver & place fresh liver

- Auxiliary
- DS Liver not removed but pt transplant right next to it

- for fulminant liver failure

- Domino
- When liver is taken from pt who is already suffering from systemic disease

- Amyloidosis can act as Domino Liver Transplant

CHILD PUGH SCORE

- A
- Compensated liver disease

- B
- Not candidate for liver transplant

- C
- HLA matching is not imp for liver transplant

COMPLICATIONS

1. REJECTION

No hyperacute rejection in liver.

Acute rejection can occur becoz of immunological cause & suppressed by immunosuppressants
Chronic → Biopsy → Vanishing Bile Duct Syndrome

1. Injection
2. Hali’s
3. PTLD
4. HCC vascular Comp. ⇒ Hepatic artery thrombosis

HCC is not a C/I for Liver Transplant
\[ \downarrow \]
Can be transplanted provided he meet
MILAN criteria

1. Single Tx < 5cm \[ \text{No Lympho vascular Invasion} \]
2. 1-3 Tx < 3cm \[ \text{No metatasis} \]
**HERNIA.**

Uncomplicated Hernia → reducibility
Cough impulse

Obstructed Hernia → irreducible
No cough impulse
Blood supply to the content & stve intact

Strangulated Hernia - obstructed + compromised blood supply.

1. Bowel & content → enterocele
2. Omentum → omentocele
3. Littre's → Meckel's content
4. Amayand Hernia → appendix is content
INGUINAL HERNIA

M/c Hernia - Indirect inguinal Hernia

- Left
- Right

Femoral is more common in Q.

Henceback's A:

Myopectineal Orifice of FRASCAUD

Sup. - arching fibres of Int. Oblique
Medial - outer border of Rectus
Inf. - Pectineus / Cooper
Lateral - Tendon of iliopectas.

It covers defect of 3 Hernia:

- Inguinal
- Femoral
- Obturator

Covering at T mesh. ⇒ 3 Hernia prevented.

Deep Ring Occlusion Test
Single Belt test.
If Hernia is not palpable ⇒ USG.

Spermatozoon's Hernia ⇒ IOC - MRI.

Mx -  sx.

1) Herniotomy
   Identify the sac
   open the sac
   push the contents down
   cut the excess sac
   close the sac

2) Herniorhaphy
   Perforum 1, 2 + Suture the ends
   → Tension → the leading cause of failure of
   Herniorhaphy

   Bassini
   Shouldice

   Sx & oc - infected, strangulated Hernia.
Hernioplasty
Put Mesh over defect

Lichtenstein Tension
Free

\[ \downarrow \]
Least Recurrence Rate

Complications of Open Inguinal Hernia Sn-
1) M/c N/’t Injured -> Ilioinguinal
2) M/c "entrapped in mesh" -> Ilio hypogastric
3) Injury to vas.
4) Chronic Inguinal Pain -> due to n’/t entrapment

Laparoscopic inguinal Hernia Sn can also be done
1) Bil
2) Recurrent

\[ \text{TEP} \rightarrow \text{TAPP} \]

Total extraperitoneal >> Transabdominal pre-peritoneal Repair

To keep mesh in place, we use Stapler or Tacker.

* 2 areas where stapler / Tacker are not used
  1) Triangle of Doom
     - Bleeding
Deep ring (superior) | Gliopubic Tract

vas deferens
(Hedal)

Testicular vein (lateral)

\[ \Delta \text{ of Pain} \]

Peritoneal Reflection (inferior)

\[ \Delta \text{ of Pain} \]

| 1) femoral b/r | 2) Femoral n/v | 3) Lat. cut. n/v of thigh |

ext. iliac
vein
gonadal b/r of genitofemoral n/v

\[ \Delta \text{ of Pain}. \]

\[ H/c n/v entrapped \rightarrow \text{Lat. cut. n/v of thigh} \]

\[ \Uparrow \]

Meralgia Paresthetica.

A of Doom + A of Pain \rightarrow \text{Trapezoid of Disaster}

\[
\begin{array}{c}
\text{Doom} \\
\text{Medial} \\
\text{Lateral}
\end{array}
\]

\[ \text{NO STAPLER} \]

**FEMORAL HERNIA**

Come out through femoral ring.

Femoral ring is surrounded by ligamentum str.

\[ \downarrow \]

\[ \text{So can't dilate} \]

So prone to strangulation.

\[ \text{septum} \]

\[ \text{Lacunar} \]

\[ \text{Lig} \]

\[ \text{pectineal} \]

\[ \text{Lig} \]
Inguinal Hernia
above, medial to pubic tubercle

Femoral
Below, lateral to pubic tubercle

Sx can be done by
Open  Laparoscopic

Special Types

1) Velpaue Hernia / Pre-vascular
   → come in front of femoral vessel

2) Serpeni
   → 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 fat → sublay
Epigastric Hernia / Fatty Hernia of Linea alba

Xiphisternum to Umbilicus.

Usually in midline

H/C structure c hernias out ⇒ Pre-peritoneal Fat
Pts c 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

↑ rate of strangulation

All paraumbilical Hernias
Require Sx
Conservative Mx & done for 2-3 yr.

If Hernia persist

Sx

Spigelian Hernia / Intraparietal Hernia

- Ext. Oblique
- Int. "
- Transverse
  - Defect in Transverse
  - Sac Hernia in M/s layer

- We can know about it when strangulation occurs.

- Midline = outer border of rectus close to
  - Accurate line [mid pt. between umbilicus &
    pubic symphysis]

- M. ASDH HERNIA
  - W shaped hernie
  - If strangulation occurs
    - 1st occurs in part
      - e in intraperitoneal
Significance → strangulation can be missed because strangulated is intra-peritoneal

Richter Hernia
Narrow Defect
Strangulation
  Femoral + parambilical Hernia

Usually detected late because initial features are those of gastroenteritis.

Long Diaphragmatic Hernia
Medial circumferential incision is made over the defect while repairing the defect.

Special Types of Inguinal Hernia
1. Gibson → Adj. H + Hydrocele
2. Pontaloon’s → Direct + Indirect
3. Sliding → Inguinal H in ≤ the Post. Boundary of sac is formed by a visceral she.

Significance → while dissecting the sac, we can injure sta.

Commonly seen in elderly

M/c sta. involved is Sigmoid Colon
Sportsman's Hernia-

1. Small inguinal hernia comes out through tear in post. wall of scrotum.

2. Pt. presents with inguinal pain
   Not palpable since it is small

Ioc → MRI

Rx - Laparoscopic repair