Contents

GENERAL SURGERY : PART 1

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Day Care Surgery

00:02:05

Definitions :

- Daycare/Same-day surgery : Admitted + discharged within 12 hours.
- Overnight stay : 23-hour admission + early morning discharge.
- Short stay surgery : Admission up to 72 hours.

Selection Criteria :

medical	Social	Surgical
• Physiological > Chronological age. • ASA status > 2 : Careful review (Involve anaesthetist). • BMI < 40 : Surgery not C/I.	• Availability of responsible adult carer for 1st 24 hrs. • Suitable home conditions. • Ability to contact hospital in an emergency.	Operations up to 2 hrs : Recognized as day care surgeries.

Eligibility based on ASA grade → 1 and 2 : Stand alone day care unit.
→ 3 : Integrated day care surgery centre.

Other criteria :

- BP < 180/100 mmHg.
- In a diabetic : HbA1C < 8.5 (Skip morning dose of OHA).
- Eligible BMI (kg/m^2) :
  - < 40 → Surface procedures.
  - < 38 → Laparoscopic procedures.
- Well controlled case of epilepsy are eligible.

Anaesthesia and Analgesia Used :

- Total intravenous anaesthesia (TIVA) → Propofol (↓Post-op nausea + vomiting).
- Post-op analgesia : Infiltration with bupivacaine (Long acting, most cardiotoxic).

Post-operative Complications :

- m/c complication (Post-day care Sx) : Nausea + vomiting (Assessed using Apfel score).
- m/c complication requiring readmission : Hemorrhage.
- Pain.

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Discharge Criteria :

- Vital signs stable (Atleast 1 hour) + oriented to time, place, person.
- Adequate pain control with oral analgesia and understands how to use it.
- Has taken oral fluids, has passed urine (If appropriate).
- Minimal wound discharge/bleeding.
- Able to dress + walk where appropriate + responsible adult to take them home.

ERAS PROTOCOL

ERAS : Enhanced Recovery After Surgery.

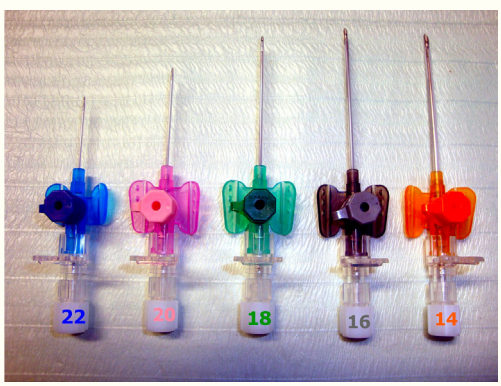
Preoperative	Intra-operative	Post-operative
• Counselling. • Avoid mechanical bowel preparation (D/t fluid + electrolyte imbalance). • Permitted to take prior to Sx : a. Solids up to 6 hours. b. Clear carbohydrate rich liquids up to 2 hours. (Carbohydrate loading).	• Surgical approach : Minimally invasive. • Bupivacaine infiltration. • Keep patient warm. • Nausea + vomiting prophylaxis. (At least 2 classes of medications).	• Use NSAIDs, avoid opioids. • Within 24 hours : – Discontinue IV fluids. – Start with liquids f/b regular diet. – Ambulate. • Avoid drains./Plan early removal.

Patient Safety, OT Zones, Surgical Positions 00:07:14

IV Cannulas :

Colour-coding :

Color	Gauge	Maximal Flow Rate (mL/min)
Yellow	24G	13
Blue	22G	30
Pink	20G	67
Green	18G	96
Gray	16G	240
Orange	14G	270

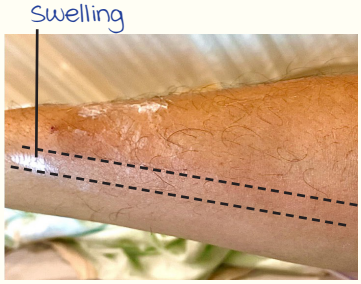


IV cannulas

- Violet : 26G.
- White : 17G.

Superficial thrombophlebitis :

- m/c complication of cannula insertion.
- Presentation : Cord-like tender swelling at the site and takes few weeks to resolve.
- Mx : Topical heparinoids (Thrombophobe).



Superficial thrombophlebitis

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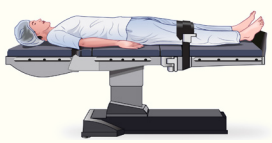
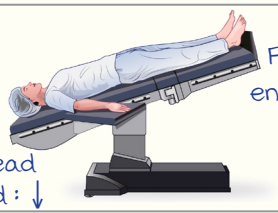
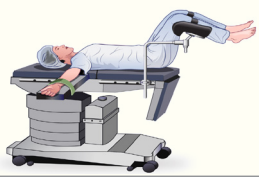
Surgical Safety Checklist :

Sign in	Time out	Sign out
Before induction of anesthesia. (Ward → OT)	Before skin incision.	Before patient leaves OR (At skin closure).
• Confirm : Patient identity, site, procedure. • Written consent to be taken. • Surgical site marking. • Inquire about allergies. • Confirm pulse oximeter functioning. • Evaluate risk of blood loss.	• Verbal confirmation of : Patient, site & procedure name. • Surgeon confirms : – Operative duration. – Anticipated blood loss. • Anaesthetist : Antibiotic prophylaxis (To be given within 60 minutes of the procedure).	Confirmation : • Nurse : Gauze + instrument count. • Surgeon : Specimen labelling. • Anaesthetist : Actual blood loss.

OT Zones :

Protective zone	Clean zone (Connects protective zone to aseptic zone)
• Change rooms • Transfer bay • Pre & post op rooms • ICU/ PACU	• Equipment store room • Maintenance workshop
Aseptic zone	**Aseptic zone**
• OT	• Waste disposal

OT Positions :

Surgical position	Uses	
1. Supine (m/c used)	Abdominal and breast surgeries.	
2. Trendelenburg	Pelvic surgeries.	
3. Reverse Trendelenburg	Upper abdominal surgeries. (E.g : Laparoscopic cholecystectomy)	
4. Lithotomy	• Obstetric, gynaecological, urological procedures. • Common peroneal nerve injury : If legs not properly supported.	

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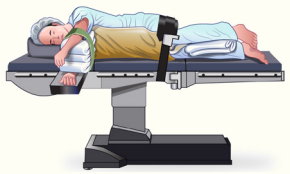
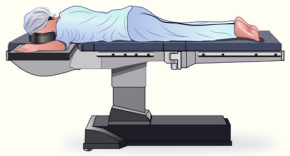
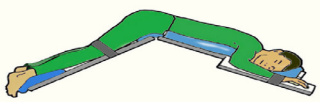
Surgical position	Uses	
5. Lateral/Kidney position	• Thoracotomy, Kidney surgeries. (Eg : Nephrectomy) • Brachial plexus injury due to hyperextension of arms.	
6. Prone	Spinal surgeries and pilonidal sinus surgeries.	
7. Sitting/Fowler's position	• Posterior cranial fossa procedures. • Advantage : – Better exposure. – Bloodless field. • Disadvantage : ↑Risk of air embolism.	
8. Jack-Knife	Not preferred (D/t positional asphyxia)	

Note :

Air embolism :

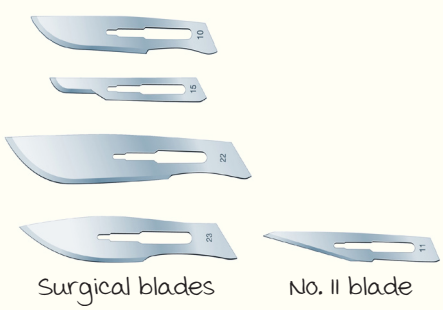
- 50 to 100 cc of air getting sucked into the vein.
- Clinical scenarios :
  a. During thyroid/head and neck surgery → Vein nicked.
  b. While operating in sitting position.
  } Sudden desaturation.
- Mx of suspected air embolism : Durant's position/Left lateral (Right side up) + legs up.
- Significance : Air remains in right side of heart → Easy aspiration. (Image guided)

Surgical blades and Energy Sources

00:18:28

SURGICAL BLADES

Surgical blades	Uses
No. 11 (Pointed/stab blade)	• Incision and drainage • Arteriotomy
No. 12 (Curved blade)	Suture removal
No. 10, 15, 20, 21, 22, 23 (Blades with a belly)	Making incisions



Surgical blades No. 11 blade

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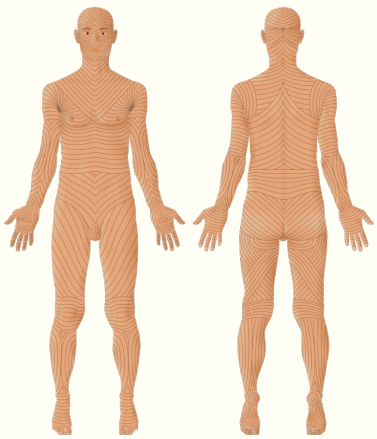
Blade handling :

- Blades passed in a kidney tray to prevent injuries.
- Blades mounted on BP handle.
- Incision made from far to near.

Bard Parker (BP) handle

Note : Langer's lines.

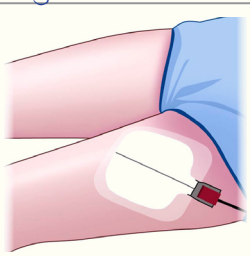
- AKA relaxed tension lines.
- Lines are perpendicular to action of underlying muscle.
- Incisions are made parallel to the lines (Give good scars).



Langers line

ENERGY SOURCES

Monopolar v/s Bipolar Cautery :

Monopolar cautery	Bipolar cautery
Flow of current : Tip → Body → Cautery pad → Machine. (To cut/ coagulate)	Flow of current (Locally completed) : Prong 1 → Body → Prong 2
Cautery pad : • Placed over well vascularized area. • Wide area of contact required. • If small → Burns at attachment site.	No cautery pad required
Disadvantages : • Thermal damage to nearby nerves & vital structures. • Interference with cardiac conduction	Advantage : • Safe to use with pacemakers. • Can be used near vital structures, end arteries.
	Surgeries used : Thyroid, parotid, penile, CNS sx, ear lobule.
Can cut and coagulate	Only coagulate
 Buttons Yellow : Cut Blue : Coagulate  Cautery pad	

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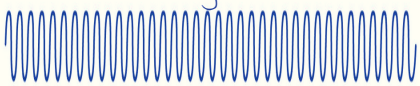
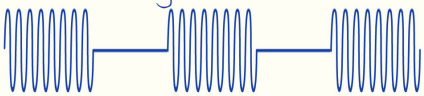
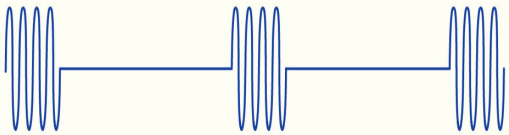
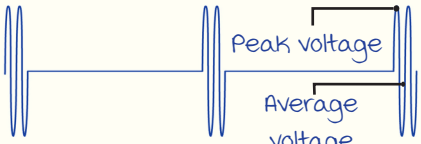
Modes of currents :

	Cutting	Coagulation
Current	Low voltage, continuous	High voltage, alternating
Uses	Cuts the tissue	Stops bleeding
	Cutting mode 	Coagulation mode 

Other modes :



Blend mode



Fulguration mode

Harmonic Scalpel :

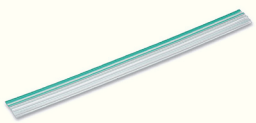
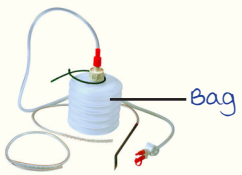
- Working principle :
  - Ultrasonic, coagulation without heat production.
  - Oscillatory blade (20,000–50,000 Hz oscillation).
- Advantage :
  - Precise cut.
  - Can cut through scar tissue.
  - Can be used close to vital structures.

Harmonic scalpel

Drains, Sutures and Knots

00:24:40

DRAINS

	Drains	Significance	
Open drain	Corrugated rubber drain	• Used in abscess cavities. • Rarely used. • Disadvantage : Pus drains out, soaks dressing.	
Closed drains	Romovac suction drain	• Negative pressure exerted. • Used after mastectomy, thyroidectomy, neck dissection.	
	Mini-vac drain	Smaller version of Romovac drain (Works on the same principle).	

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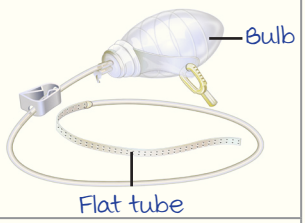
	Drains	Significance	
Closed drains	Jackson Pratt drain	• Works on negative pressure. • Flat tubing and a bulb instead of a bag.	
	Abdominal drain	• Placed in abdomen. • No negative pressure.	
	Under water seal bag	Connected to chest tubes. (End of tube is submerged under water : Prevents air getting sucked in.)	

Surgical Knots, Sutures

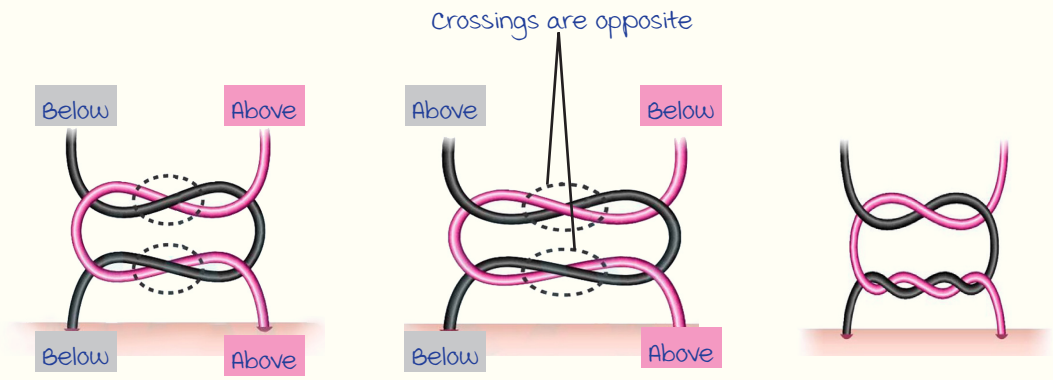
00:27:41

Types of surgical knots :

a. Square/Reef knot :
- Secure knot; does not open up.
- 2 throws f/b a single throw.

b. Granny's knot/Slip knot : Not secure, opens up (Avoided).

c. Surgeon's knot : 2 throws f/b single throw.

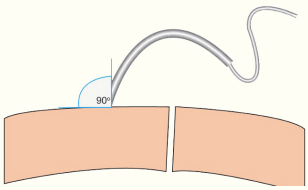


Reef/Square knot | Granny/Slip knot | Surgeon's knot

----- Active space -----

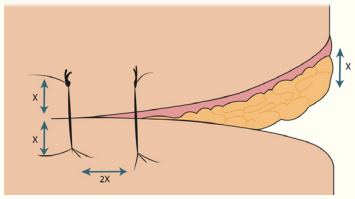
SUTURES

Skin suturing :



Needle entry

- Edge should be everted.
- Needle entry : 90° with skin.
- Bite on each side : X.
- Distance b/w 2 sutures : 2X.

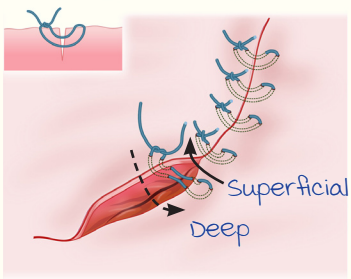


X : Depth of wound.

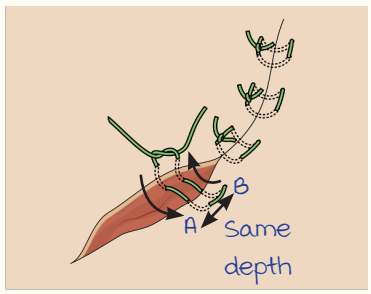
Types :

a. Simple sutures : Fail to cause edge eversion.

b. Mattress suture : Hemostatic sutures, causes eversion of edges.



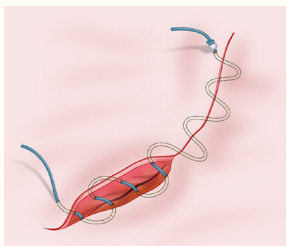
Vertical mattress



Horizontal mattress

c. Subcuticular sutures :

- No needle marks on the skin.
- Suture is buried from inside.
- Cosmetically better.
- Suture material : 3-0/4-0 Monocryl (Absorbable) on cutting needle.


Subcuticular sutures

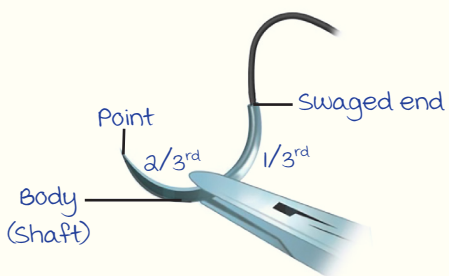
d. Purse string sutures :

Uses :

- Rectal prolapse surgery (Thiersch wiring).
- Cervical encerclage in cervical incompetence.
- Bury appendicular stump.


Purse string suture

Needle : Terms and Types



- Swaged end : End of needle where suture material is attached.
- Needle to be held at : 1/3rd from swaged end and 2/3rd from pointed end.

Types :

----- Active space -----

Round body (RB) needle	Cutting/Reverse cutting needle
Rounded cross section; atraumatic	Triangular cross section
Used for delicate structures (All B's) : Bowel, Bladder, Common Bile Duct (CBD), Blood vessels.	Used for tough structures (All S's) : Skin, Sheath, Fascia

Numbering of Sutures :

- No. 1 suture ⟶ Thickest,
  No. 11-0 ⟶ Finest suture (Suture becomes finer : Number ↑ + zero added after number.)
- Thick suture : Easier to handle.
- Finer suture : Difficult to handle (Break/fractures more common).

Types of Sutures :

Absorbable sutures		Non-absorbable sutures	
Natural	Synthetic	Natural	Synthetic
Eg : Catgut • Sheep gut derived. • Tensile strength : Duration for which suture can hold tissue together (21-28 days). • Absorption time (By enzymatic degradation) : 90 days. • Chromic catgut (With chromic salt coating) : No role in Sx.	a. Monocryl (Poliglecaprone) : • Monofilament suture. • Subcuticular suturing on cutting needle	Eg : Silk Used for : • Skin (3-0/cutting). • Fix drains (No. 1/cutting) • Bowel anastomosis (3-0/RB).	a. Prolene (Polypropelene monofilament) : Uses : • Rectus sheath closure : Jenkins theory ⟶ Minimum length required to close rectus sheath = 4 times the length of the wound. • Vascular repair/anastomosis (RB needle) : – 2-0 : Aorta. – 4-0 : Femoral. – 6-0 : Popliteal. • Mesh (Hernia repair).
	b. Vicryl (Polyglactin) : • Braided suture. • ↑Infection rate. • Absorption (Hydrolysis) : 60-90 days. • Uses : Bowel, bladder and CBD.		b. Nylon/Ethilon : • Monofilaments. • Uses : Skin , fixing drains, nerve & tendon repair.
	c. PDS (Polydioxanone) : • Absorption time : 180 days. • Monofilament suture. • Same use as vicryl.		

- Natural sutures (Overall) : More tissue reaction/inflammation.
- Synthetic non-absorbable sutures :
  a. Polyester : Tendon repair.
  b. Steel sutures : Sternotomy wound closure (Post CABG).

----- Active space -----

Suture removal in non-absorbable sutures :

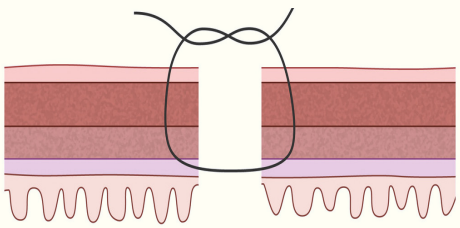
- Scalp : 5–7 days.
- Face : 3–5 days.
- Neck : 5–7 days.
- Thorax : 10–12 days.
- Abdomen : 12–14 days.
- Perineum : 10–12 days.

Bowel Anastomosis & Staplers

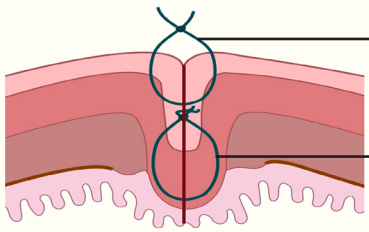
00:39:43

Bowel Anastomosis :

- Strongest layer in bowel anastomosis : Submucosa.
- Inverted edges suturing.
- 3 methods → Single layer extra-mucosal
  → Two layer
  → Using staplers
  } Similar results.



Single layer anastomosis



Double layer anastomosis

Outer suture (Non-absorbable) : Seromuscular layer.

Inner suture (Absorbable) : All layers.

Surgical Staplers :

Staplers	Uses	
Linear	• Bowel anastomosis • Sleeve gastrectomy • Zenker's diverticulum surgery	
Circular	• Hemorrhoidopexy • Low anterior resection (LAR) for rectal cancer surgery	

Post-Op Fever and Wound Infection

00:41:40

CAUSES OF POST-OP FEVER

- Day 1 :
  - m/c cause : Atelectasis.
  - Prevention :
    i. Chest physiotherapy : Incentive spirometer.
    ii. Pain control.
    iii. Steam inhalation.
    iv. Cessation of smoking (4–6 weeks prior to surgery).

Incentive spirometer

- Day 2-3 :
  - Superficial thrombophlebitis.
  - UTI : m/c hospital acquired infections.
  - Pneumonia.
- Day 4-5 :
  - Surgical site infection.
  - Deep Venous Thrombosis (DVT).
- Day 6 : Burst abdomen/Abdominal wound dehiscence.
- Day ≥ 7 : Intra-abdominal abscess/collection.


Pneumonia : Middle lobe consolidation


SSI

Surgical Site Infection (SSI) :

- Wound infection within 30 days of surgery.
  Post implantation : within 1 year of surgery.
- Scoring systems :

ASEPSIS Score	Southampton wound score
ASEPSIS : • Additional treatment • Serous discharge • Erythema • Purulent exudate • Separation of deep tissues • Isolation of bacteria • Prolonged Stay > 14 days	• 0 : Normal healing • I : Normal healing + mild bruising/erythema • II : Erythema + other inflammatory signs • III : Clear discharge • IV : Pus discharge • V : Deep/severe wound infection ± tissue breakdown

DVT Prophylaxis :

Pneumatic compression stockings used.

Pneumatic anti-DVT stockings

Anti-shock garment

Burst Abdomen :

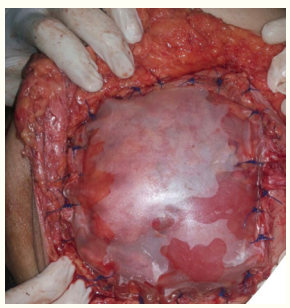
Rectus sheath wound opens up : Bowel exposed out.

C/f : Salmon fluid sign/Serous fluid sign (Large quantity of clear fluid oozes out of the wound).

Mx :

- In emergency : Urobag or bogota bag laparostomy.
- Definitive : Rectus sheath resuturing.


Burst abdomen


Urobag laparostomy

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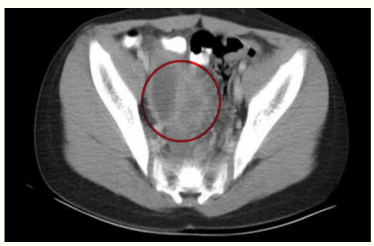
Factors predisposing to burst abdomen :

Patient factors :
- Chronic cough.
- Constipation.
- Infection/obesity.
- Immunocompromised.
- Malnourished.

Surgery factors :
- Midline incision > Transverse.
- Emergency > Elective.
- Continuous sutures > Interrupted.
- Large bite > Short bite (Ideal : 0.5 cm).
- Short thread > Long thread (Minimum 4 times the length preferred).

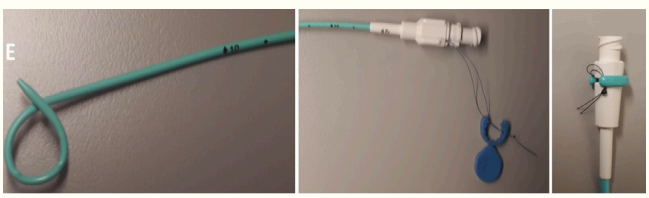
Intra-Abdominal Abscess :
- m/c site overall.
- m/c site in an ambulatory patient. } Pelvis/Pouch of Douglas (POD).
- m/c site in supine patient : Morrison's/hepatorenal pouch.


Pelvic abscess

Presentation :
- Fever + chills and rigors.
- Pelvic abscess : Present with pelvic diarrhoea (Repeated episodes of loose stools + mucus).

IOC : CECT.

Mx : Drainage with pigtail catheter under imaging guidance.


Pigtail catheter

Wounds

00:49:40

Types of wound	Examples	Percentage of SSI	
		With antibiotic prophylaxis	Without antibiotic prophylaxis
Clean wound	Clean incised wound : • Thyroid surgery. • Breast surgery. • CABG. • Knee replacement. • Uncomplicated inguinal hernia surgery.	1–2%	
		No role of prophylactic antibiotic in clean wound except when implant or mesh is placed.	
Clean contaminated wounds	GI/GU system but there is no inflammation : • Elective/interval cholecystectomy. • Elective appendectomy. • Urinary stone removal when no UTI. • LSCS. • Laparoscopic abdominal hysterectomy. • Bowel surgery, if the bowel is prepared.	3%	6–9%

----- Active space -----

Types of wound	Examples	Percentage of SSI	
		With antibiotic prophylaxis	Without antibiotic prophylaxis
Contaminated wounds	GI/GU system but there is non purulent inflammation : • Emergency/interval cholecystectomy. • Emergency appendectomy. • If the bowel is opened while operating a case of intestinal obstruction. • Breach in sterile protocol : Eg. Open cardiac massage.	6%	20%
Dirty wound	Pus present : • All abscesses. • Peritonitis/Fecal contamination. • Any neglected traumatic wound > 6 hours .	7–8%	20–40%

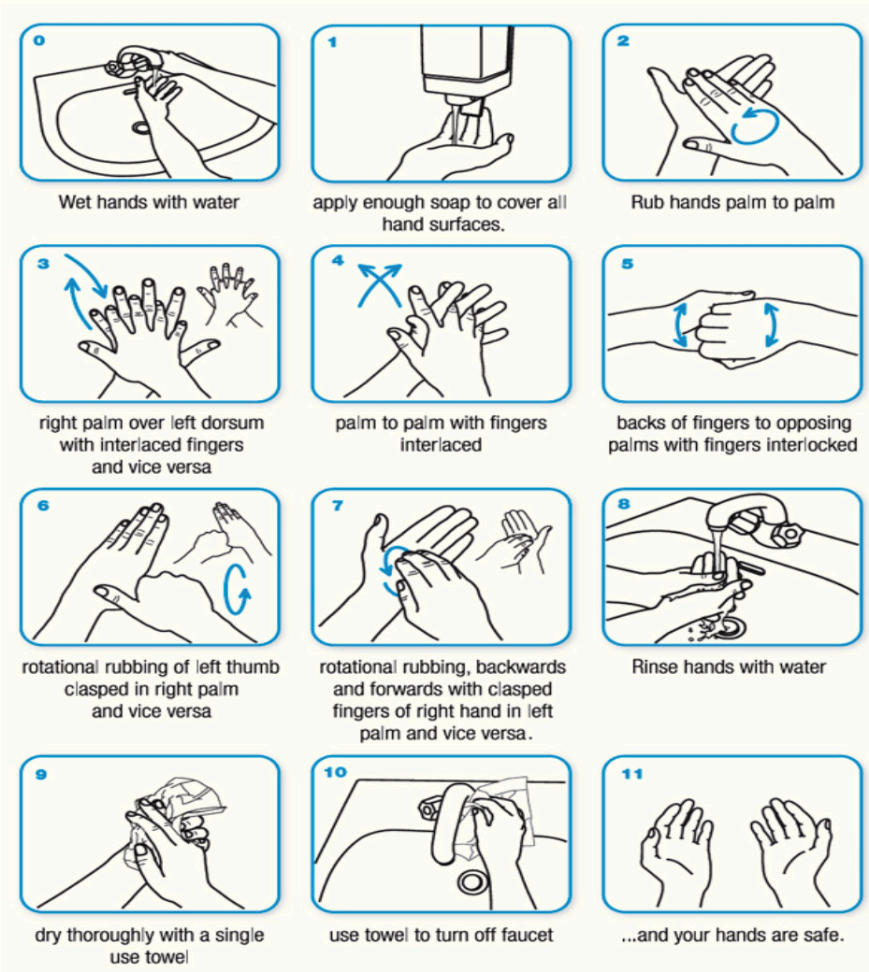
Note :

Elective OT list : Clean cases (Eg : Implant insertion) posted first.

Prevention of Wound Infection :

a. Hand hygiene :

- Steps :



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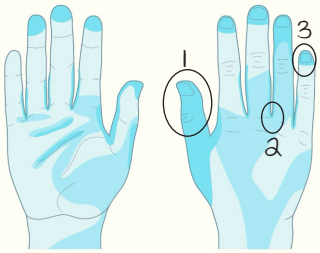
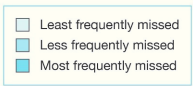
- Areas missed while hand washing :



1. Thumb.
2. Inter digital areas.
3. Finger tips.



- 5 moments of hand hygiene :

"2 Before" :

1. Before touching a patient.
2. Before clean/aseptic procedure.

"3 After" :

3. After body fluid exposure risk.
4. After touching a patient.
5. After touching patient's surroundings.

- Soap and water/sanitizer should be used.
  - C/I for sanitizer use :
    - i. After toilet visit.
    - ii. Visibly soiled hands.

b. Parts preparation :

Hair clipper :

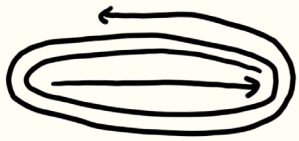
- Used to trim hair (Prior to surgery).
- Avoid shaving before surgery (↑Infection rates).

Hair clipper

c. Cleaning of the part of body :

- Agent used : Betadine/Alcohol.
- Area cleaned → Abdominal Sx → Males : Nipples to mid thigh.
  Females : Inframammary fold to mid thigh.
  Limb Sx : Till 1 joint up.
- Direction of cleaning :
  - Abdomen : Midline to lateral.
  - Limbs : Lateral to medial.

  F/b → Sponge disposal.
  - Circumferentially outwards from incision site/ midline.



Circumferential cleaning

d. Prophylactic antibiotics :

- Given 30 to 60 minutes before Sx.
- Prolonged Sx : Repeat dose after 4 hours.

e. Prevent hypothermia.

f. Prevent blood loss : Achieve proper hemostasis.

GENERAL SURGERY : PART 2

----- Active space -----

Surgical Nutrition

00:00:32

Nutrition Assessment :

- No single reliable biochemical marker to identify malnutrition.
- Indicator of poor prognosis : Unintentional weight loss of >10% in 3 months.
- Indicator of poor outcome : Low albumin, BMI <15.
- Assessment
  - Fat : Skin fold thickness.
  - Muscle mass : Mid arm circumference.

Malnutrition Universal Screening Tool (MUST) :

BMI score	+	Weight loss score	+	Acute disease effect score	=	Overall risk of malnutrition.

Types :

- Enteral (Oral/gut).
- Parenteral (IV route).

Enteral Nutrition

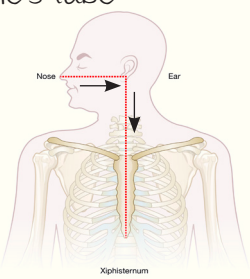
00:01:42

- Better method.
  - More physiological.
  - Prevents translocation of gut bacteria.
- Best route : Oral.

Not possible ↓

Duration of requirement
- >3 weeks → Gastric emptying
  - Good → Feeding gastrostomy.
  - Poor → Feeding jejunostomy.
- <3 weeks → Gastric emptying
  - Good → Nasogastric (NG) tube. (Ryle's tube)
  - Poor → Nasojejunal (NJ) tube.

Ryle's tube :



Length assessment


NG tube (Ryle's tube)

Check NG tube position by :

- Clinical methods :
  - Aspirating gastric contents.
  - Pushing air —F/b→ Auscultation in epigastrium.
- Imaging : Chest X-ray.

Patient position for insertion : Sitting with neck slightly flexed.

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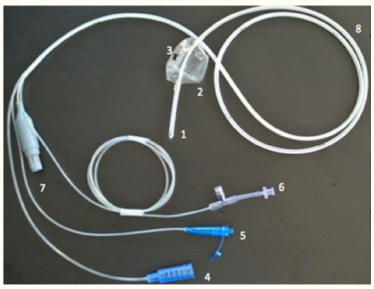
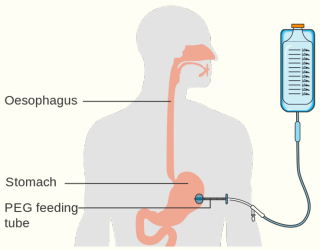
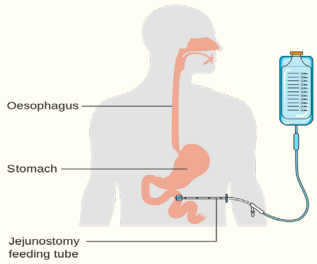
Other enteral methods :



NJ tube
(Bypasses stomach)



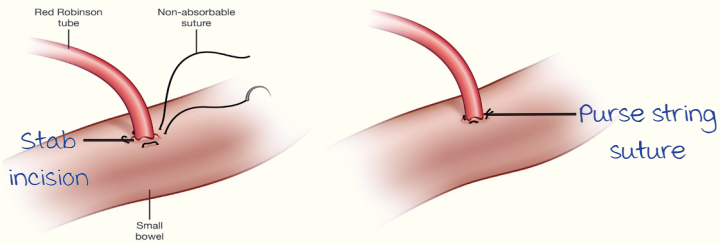
Feeding gastrostomy :
- more physiological.
- ↑Risk of aspiration.



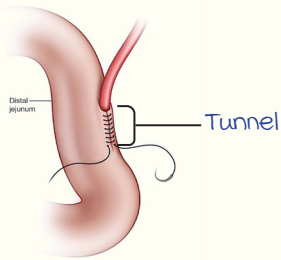
Feeding jejunostomy

Techniques for Gastrostomy and Jejunostomy :

1. Open techniques :



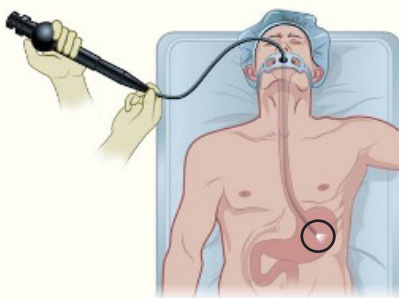
a. Stamm method :
↑Chances of peri-drain leak.



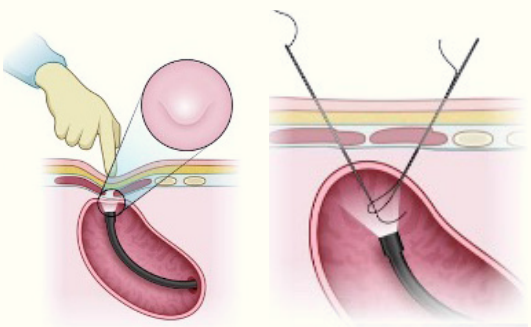
b. Witzel technique :
↓Chances of peri-drain leak.

2. Percutaneous Endoscopic Gastrostomy (PEG) :

Method of insertion :



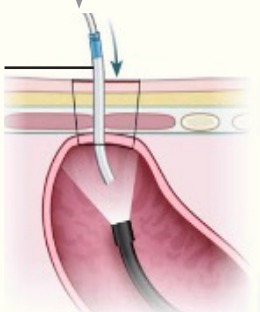
Endoscope passed in stomach



Illuminated site palpated + punctured

Introducer of PEG

PEG set



PEG tube inserted over the guide wire and secured

3. Radiologically Inserted Gastrostomy (RIG) : Done when endoscopy is not possible.

----- Active space -----

Complications of Enteral Nutrition :

Tube related (m/c)	Feeding regime related
• Blockade • Migration • Leak	• Osmotic diarrhoea (Sugar rich fluids) • Overfeeding (↑Risk of aspiration)

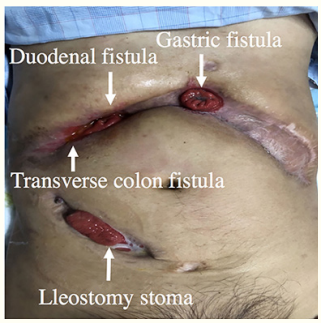
Parenteral Nutrition

00:08:40

Best route : Central line.

Indications :

- Prolonged paralytic ileus (>72 hours).
- Short bowel syndrome (<200 cm small intestine).
- High output faecal fistula (>500 cc/24 hours).
- Acute episodes of inflammatory bowel disease.
- Acute severe pancreatitis (Initial phase only).

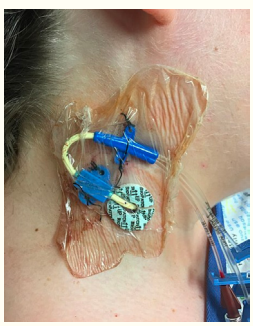
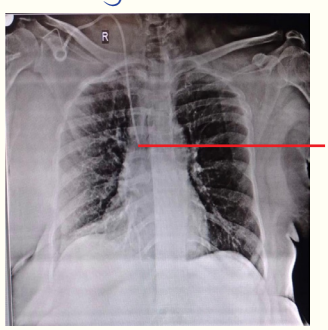


Fecal fistula

Central Line :

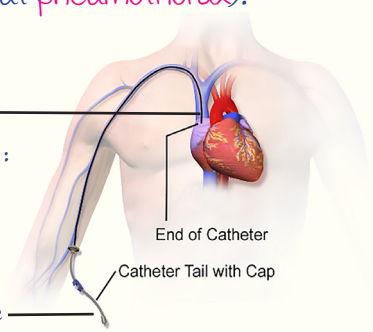
	Subclavian vein	Internal jugular vein	Femoral vein
Risk of thrombosis & infection	Least	Intermediate	Maximum
Risk of pneumothorax	Maximum	Intermediate	Least
Ease of insertion		Maximum ease.	
Others	m/c used in Total Parenteral Nutrition (TPN)	m/c used vein overall	

Post-insertion : Chest x-ray (Look for central line tip & rule out pneumothorax).



Central venous catheter

Catheter tip position :
- In SVC.
- Just above the Rt atrium.

Inserted like IV line



Peripherally Inserted Central Catheter (PICC line)

TOTAL PARENTERAL NUTRITION (TPN)

Contents : (Lacks fibre content) Protein : Fat : Carbohydrate
20 : 30 : 50

Infusion rate : 1-2 litres/24 hours.

TPN solution modifications :

Respiratory failure	Renal failure
• ↓Carbohydrate (↓Osmolar) • ↓Quantity	• ↑Carbohydrate • ↓Quantity


TPN solution

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Monitoring of Patients on Feeding Regimes :

Recommended schedule for monitoring feeding regimens	
Daily (Clinical measures)	• Pulse, blood pressure and temperature. • Body weight (↑ : Earliest sign of overfeeding). • Input/output chart. • Type of nutrition given.
Biochemical measures : • Initially daily. • Later once/twice a week. (When on stable regime)	• Sodium, potassium, urea and creatinine. • Blood glucose. • Magnesium and phosphate. • Liver function tests. • C-reactive protein.

Complications of TPN :

Central line related	Feeding regime related
• Pneumothorax. • Arrhythmias. • Thrombosis. • Air embolism. • Migration. • Catheter related sepsis (m/c central line complication).	• Hyperglycemia (m/c). • Excess weight gain. • Cholestasis (Withhold TPN). • Micronutrient deficiency (m/c : Zinc deficiency). • Refeeding syndrome.

Catheter related sepsis :

- On fluid administration → Fever + chills & rigors.
- Ix : Cultures from → Catheter tip.
  - Peripheral line.
  - Central line.
- Mx : Remove catheter if it is the source.

Refeeding syndrome :

- Large quantities of nutrition given to chronically malnourished.
- Main cause of death → Congestive heart failure.
  - Arrhythmias.

Metabolic derangements	
• $\downarrow K^+$	• $\downarrow Mg^{2+}$.
• $\downarrow Ca^{2+}$.	• Fluid overload.
• $\downarrow PO_4^{3-}$: main driver.	

- Patient at risk of developing refeeding syndrome : (≥ 1 factor.)
  - BMI <16 kg/m^2.
  - Unintentional weight loss >15% within last 3–6 months.
  - Little/no nutrition intake for >10 days.
  - $\downarrow K^+/\downarrow PO_4^{3-}/\downarrow Mg^{2+}$ prior to feeding.

Prevention :

1. ↑Feeds gradually (Initially 10 Kcal/Kg/day → Full feeds in 4–7 days).
2. Strict electrolyte levels monitoring.
3. Thiamine supplementation.

----- Active space -----

Liver dysfunction in TPN :

Long term TPN use → 25% liver derangement

- Fatty liver (m/c) :
  - Children (m/c).
  - Modified using lipid free solutions.
- Intestinal Failure Associated Liver Disease (IFALD) :
  - Small number of patients.

Hartmann's/Ringer Lactate (RL) Solution :

Composition (In mEq/L) :

Na^+	K^+	Ca^{2+}	Cl^-	Lactate
131	5	2	111	29

Note :

- Metabolic derangements in fecal fistula : Fluid + electrolyte imbalance.
- Maximum in pancreatic and biliary fistula —Opening in→ Duodenum.

Hypovolemic/Hemorrhagic Shock

00:21:19

m/c type of shock.

Types of hemorrhage :

a. Overt/Visible hemorrhage :

b. Concealed/Covert hemorrhage :

Sites :

- Neck.
- Thorax.
- Abdomen.
- Pelvis.
- Long bones.

Hemorrhage in surgery :

	Primary	Reactionary	Secondary
Duration	During Sx	Within 24 hours.	After 7–14 days.
Reason		Clot dislodgment or knot slippage.	Sloughing of wall. (D/t infection.)

----- Active space -----

Classification of Hypovolemic Shock :

	Class I	Class II	Class III	Class IV
Other names	-	Mild/ Compensated	Moderate/ Decompensated	Severe
% of blood volume lost	0–15%	15–30%	31–40%	>40%
Amount of blood lost	<500 cc	500 cc – 1 litre	1–1.5 litres	>2 litres
Pulse rate	Normal	↑ (Earliest sign)	↑	Not recordable
Blood pressure		(N)SBP, ↑DBP	↓SBP	Not recordable
Respiratory rate		Normal	↑	↑
Urine output		Normal	↓	No output
Mental status		Thirsty & anxious	Confused	Comatose
Base deficit (mEq/L)		-2 to -6	-6 to -10	> -10
Management	Oral liquids	IV crystalloids	IV crystalloids + colloids (3 : 1 ratio)	Massive blood transfusion

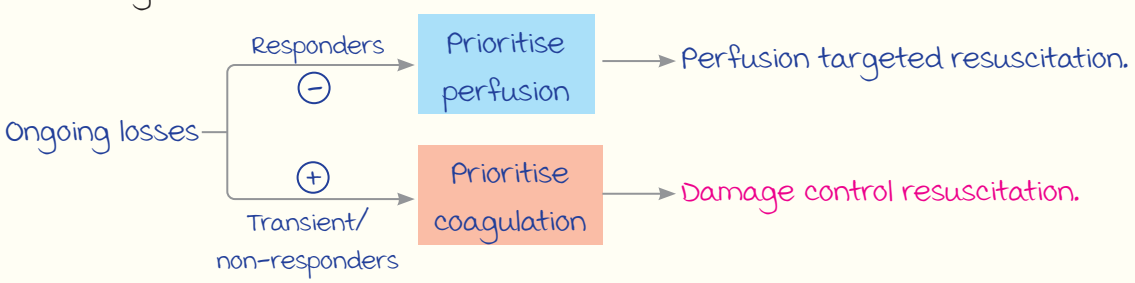
Management of Hypovolemic Shock :

Dynamic fluid response :

After 1 litre of fluid (IV bolus) administration :

	Responder	Transient responder	Non-responder
PR	↓↓		↑
SBP	↑↑		↓
JVP	↑↑		↓
Response	Sustained	Reversed in 15–20 mins d/t ongoing loss	Ongoing loss

Hemorrhage resuscitation :



Indicators :

- Determining amount of fluid requirement in shock.

PCWP	CVP
• Pulmonary Capillary Wedge Pressure. • Measures left heart pressure. • Best indicator, more accurate.	• Central Venous Pressure. • Measures rt. heart pressure. • m/c used indicator.

- Best clinical indicator of adequate fluid resuscitation in shock : Urine output.

Indices :

----- Active space -----

Shock index	Rate over pressure evaluation (ROPE)	Modified shock index
$= \frac{\text{Heart rate}}{\text{Systolic BP}}$	$= \frac{\text{Pulse rate}}{\text{Pulse pressure}}$	$= \frac{\text{Heart rate}}{\text{mean arterial pressure (MAP)}}$
>0.9 = ↑mortality rate	>3 = Decompensated hemorrhagic shock	Best index

End points of Resuscitation :

Systemic perfusion :

To normalise → Mixed Venous Oxygen Saturation (MVOS) : Best indicator.
→ Base deficit
→ Serum lactate
} Acidosis.

Massive Blood Transfusion :

Definitions :

- Replacement of entire circulating volume in 24 hours.
- >10 units of blood in 24 hours.
- >4 units of blood in 1 hour.

Complications :

- Hypothermia.
- Hypocalcemia (Citrate chelates Ca^{2+}).
- Metabolic alkalosis.
- Hypomagnesemia.
} D/t citrate toxixity.
- Hyper K^+ >> Hypo K^+ (D/t RBC lysis in stored blood).
- Coagulopathy : m/c cause of death after massive transfusion

Prevention ↓

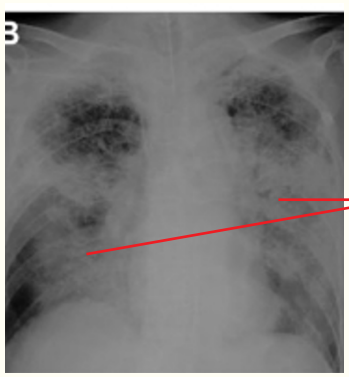
1 : 1 : 1 transfusion (RBC : Platelet : FFP)

Complications of Blood Transfusion

00:36:11

Transfusion Related Acute Lung Injury (TRALI) :

- m/c cause of death after transfusion.
- Antibodies against HLA antigen → Non-cardiogenic pulmonary oedema.
- Occurs within 6 hours of blood transfusion.
- Implicated donors → Multiparous women.
→ FFP donors.



TRALI : ARDS like picture

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Transfusion Associated Cardiac Overload (TACO) :

- Volume overload ⟶ Facial puffiness, pedal edema, breathlessness.
- Chest x-ray : Ⓝ.
- Rx : Diuretics (Lasix).

Transfusion Reactions :

Febrile non-hemolytic transfusion reactions :

- m/c, caused by graft-versus-host response.
- Leucoreduction filter : ↓Febrile reactions.

Leucoreduction filter

Other Types of Shock

00:39:23

	Hypovolemic	Cardiogenic	Neurogenic	Anaphylactic	Septic	
					Warm	Cold
PR	↑	↑/↓	↓	↑	↑	↑/↓
CO	↓	↓	↓	↓	↑	↓
SBP	↓	↓	↓	↓	↑	↓
PVR	↑	↑	↓	↓	↓	↑
Extremities	Cold	Cold	Warm	Warm	Warm	Cold
JVP	↓	↑	↓	↓	Ⓝ	↑
Acidosis	↑					
Features	Class III type	Pump failure (MI, heart block, arrhythmia)	Spinal cord transection (⊖ sympathetic system)	Mismatched blood transfusion allergic reaction (↑Histamine)	Hyperdynamic state	Heart fails in sepsis

Obstructive shock	Distributive shock
Mechanical impairment of cardiac filling (Type of cardiogenic shock).	Blood redistributes to peripheries.
Eg : 1. Tamponade. 2. Pulmonary embolism.	Warm shocks : 1. Anaphylactic. 2. Warm septic. 3. Neurogenic.

Note : MVO$_2$.

- Percentage of oxygen that returns to the heart after being utilized in the body.
- Only ↑ in warm septic shock/distributive shock.

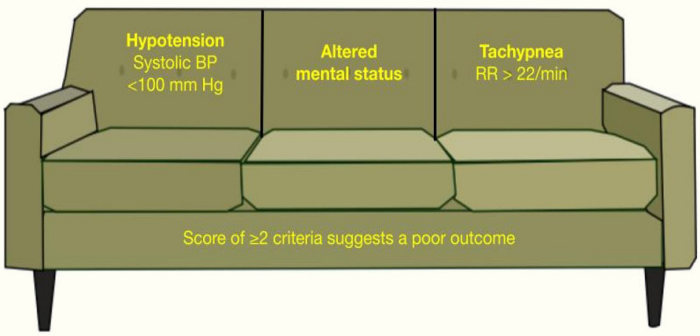
Sepsis and Septic Shock

00:46:54 ----- Active space -----

Terminologies :

	Definition & criteria
Systemic Inflammatory Response Syndrome (SIRS) (mediated by IL-1, IL-6, TNF-α)	2 or more of the following criteria : • Temperature >38°C or <36°C. • Heart rate >90 beats/min. • Respiratory rate >20 breaths/min or $PaCO_2$ <32 torr (<4.3 kPa). • WBC >12000 cells/mm^3, <4000 cells/mm^3, or >10% immature forms.
Sepsis	SIRS + known foci of infection.
Septic shock	Sepsis leading to hypotension not responding to fluids.
MODS (Multiple Organ Dysfunction Syndrome)	Failure of ≥2 organ systems.

Quick Sequential Organ Failure Assessment Score (qSOFA) :



Sepsis (New definition) :

SOFA Score ≥2 + known foci of infection.

Sepsis 3.0 Guidelines :

SIRS	Terminology removed, replaced with qSOFA/SOFA
Sepsis	Dysregulated host response to infection → Life-threatening organ dysfunction
Severe sepsis	Terminology removed
Septic shock	Need vasopressors & lactate >2 mmol/L

Sepsis Bundle :

Completed within 3 hours	Completed within 6 hours
• Measure lactate levels. • Obtain blood cultures. • Give antibiotics. • Administer IV fluids.	• Give vasopressors (maintain MAP ≥65 mmHg). • In persistent arterial hypotension → measure mvos. • Remeasure lactate (if initial levels ↑).

Sepsis Six :

Mnemonic : Give 3 & Take 3.

Within 1 hour

Give 3	+	Take 3
• IV fluids. • IV antibiotics. • Oxygen.		• Blood culture. • Urine output. • Serum lactate.

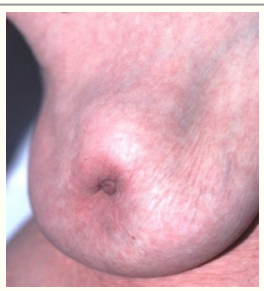
----- Active space -----

BREAST

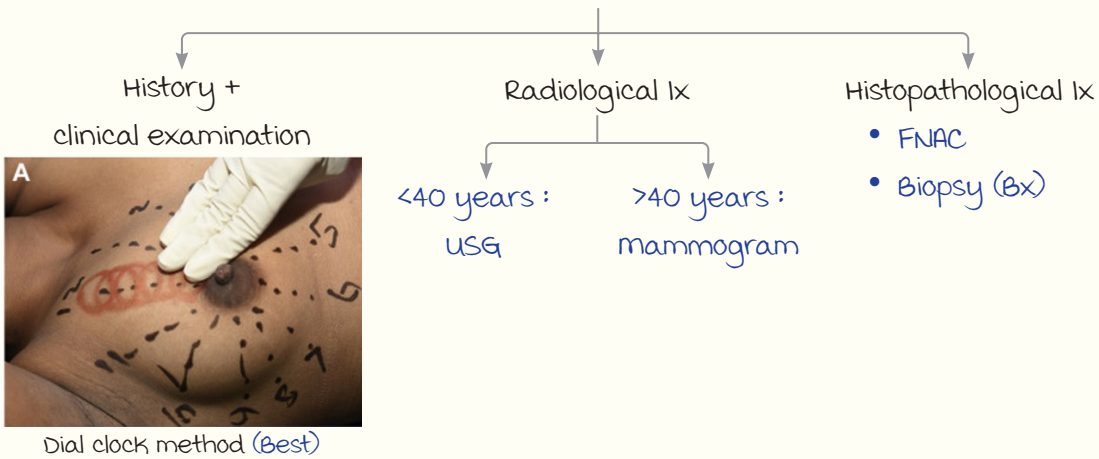
Work Up of Breast Disorders

00:00:24

Clinical Signs :

	Dimpling	Retraction	Peau d'orange (PDO)
Structure involved	Ligaments of Cooper	Lactiferous ducts	Superficial (Subdermal) lymphatics
Skin involvement in breast cancer	⊖	⊖	⊕ (T_{4b} disease)
Other features	-	• Circumferential : Malignancy • Slit-like : Duct ectasia	Seen in inflammatory breast cancer
Images			

Triple Assessment :



Dial clock method (Best)

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Breast Imaging Reporting and Data Systems (BIRADS) :

BIRADS score	Inference	Mx
0	Incomplete Ix	Additional imaging
1	Negative	No Bx; Follow up after 1 year
2	Benign	
3	Probably benign	Follow up after 6 months (Risk of cancer : <2%)
4	Suspicious : • 4a : Low suspicion • 4b : Moderate suspicion • 4c : High suspicion	Biopsy
5	Highly suggestive of malignancy	Biopsy
6	Biopsy proven malignancy	Sx excision when appropriate

ASBRS Breast Cancer Screening Guidelines :

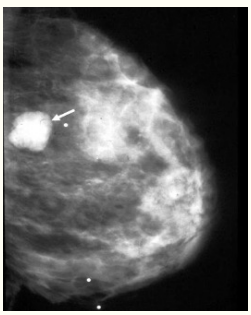
Category		Screening guideline
Average risk of breast cancer		Annual screening mammography from 40 years of age
Higher than average risk :	• BRCA mutation : ⊕ • Prior chest wall radiation	Annual MRI at 25 years. 3D mammography at 30 years
	• Predicted lifetime risk (By Gail, BRCA pro model) >20% • Strong family history	Annual 3D mammography/ MRI at 35 years
When life expectancy becomes <10 years		Stop screening.

Mammograph :

- Breast X-ray.
- Radiation exposure : 0.1–0.2 cGy.
- Advantages of MLO :
  - Axilla can be visualized.
  - Maximum breast tissue seen.

2 views :

- Craniocaudal
- Medio-lateral oblique (MLO)



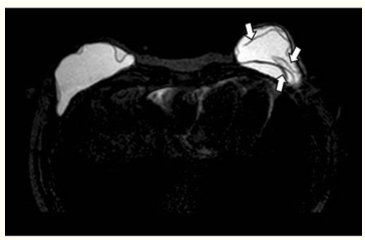
Popcorn calcification
(Fibroadenoma)

Spiculated mass
(malignancy)

----- Active space -----

MRI :

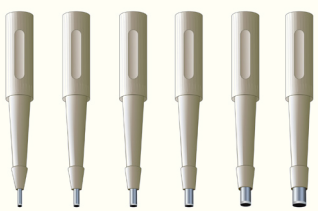
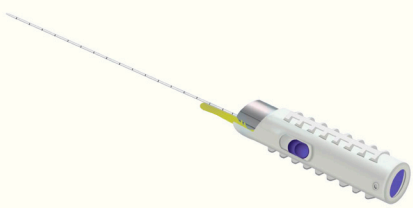
Indications
• Breast implants. • Multifocal & multicentric lumps. • Detection of local recurrence or scar recurrence. } Imaging IOC • Screening modality : Young & high-risk patients. • Suspected ductal lesions with inconclusive USG (most sensitive in Ductal Carcinoma In Situ (DCIS)).



Linguini sign (MRI) :
Intracapsular breast implant rupture

Breast implant rupture	USG findings
Intracapsular	Stepladder
Extracapsular	Snowstorm

Biopsy techniques :

Incisional biopsy	
Punch biopsy	Tru-cut/core needle biopsy
• Skin lesions/cancers • Paget's disease of breast	• IOC • 14 G biopsy gun used
	

Breast Cancer

00:09:44

Risk Factors :

- ↑Age.
- Early menarche, late menopause.
- Nulliparity.
- Smoking.
- Obesity, alcohol.
- Family history.
- Hormone replacement therapy (Estrogen + progesterone).
- Maternal age at first live birth : >30 yrs.

Note :

Smoking is associated with :

- Breast cancer.
- Duct ectasia.
- Mondor's disease.

Factors ↓ breast cancer risk
• Breastfeeding (For 1 year). • Maternal age at first live birth <20 years.

----- Active space -----

Features :

- Most common type of breast cancer : Invasive ductal carcinoma.
  - Origin : Terminal duct lobular unit (TDLU; functional unit of breast).
- Quadrants affected : M/C → Upper outer; L/C → Lower inner.

Genetic Mutations :

Breast cancer	M/C gene mutation
Sporadic cases (90%)	p53
Familial cases (10%)	BRCA-1
ER ⊕, PR ⊕	PI3CK
Triple negative/ HER-2 neu ⊕	p53

BRCA 1	BRCA 2
Chr 17q	Chr 13q
BRCA 1 > 2 : • Breast cancer • Ovarian cancer	BRCA 2 > 1 : • Pancreatic cancer • Prostate cancer • Male breast cancer

Indications for BRCA testing :
For all patients :
• Deleterious BRCA 1/2 gene mutation in a blood relative. • History of ovarian, fallopian tube and/or 1° peritoneal cancer.
Patients with breast cancer :
• ≥1 blood relatives diagnosed with breast cancer ≤45 years. • H/o B/L breast cancer at ≤50 years. • H/o triple negative breast cancer (TNBC) at ≤60 years. • H/o male breast cancer.

Immunohistochemistry (IHC) :

1. ER, PR : Nucleus stains brown (Steroid receptor).
   - Measured with Allred score (0-8).
2. HER 2 neu : Cell membrane stains brown (membranous receptor).
   - Result:
     - 0, 1+ : ⊖.
     - 2+ : Equivocal → FISH → Amplified : ⊕ / Non-amplified : ⊖
     - 3+ : ⊕.
3. Ki-67 : Proliferation index marker (Cell multiplication).

Molecular Subtypes :

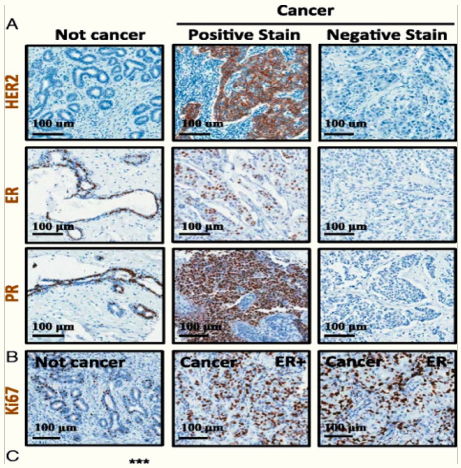
Based on gene expression profiling.

	ER	PR	Her 2	Ki-67	CK 5/6
Luminal A	⊕	⊕	⊖	Low	⊖
Luminal B	⊕	⊕	⊖	High	⊖
	⊕	⊕	⊕	Any	⊖
Her 2 enriched	⊖	⊖	⊕	Any	⊖
Basal like (TNBC)	⊖	⊖	⊖	Any	⊕
Unclassified/Claudin-low	⊖	⊖	⊖	Any	⊖

----- Active space -----

CK : Cytokeratin

Luminal A	Basal like (TNBC)
m/c type	• Seen in young patients. • Exhibit TNBC paradox : Initial good response to chemo Rx → ↑Chances to recur (D/t aggressive nature).
Best prognosis	Worst prognosis



Immunohistochemistry (IHC)

Tumor Staging :

Done by PET-CT : 18-Fluorodeoxyglucose (FDG) → $t_{1/2}$: 110 minutes.

T staging	
T_{is}	Cancer in situ (DCIS, Paget's disease)
T_1	≤2 cm
T_2	2–5 cm
T_3	>5 cm
T_{4a}	Involvement of chest wall (Serratus anterior, ribs, intercostal muscles)
T_{4b}	Involvement of skin (Ulceration, direct infiltration, PDO, satellite nodules)
T_{4c}	T_{4a} + T_{4b}
T_{4d}	Inflammatory cancer : >1/3rd of breast involvement + PDO

N staging	
N_0	No LN metastasis
N_1	Mobile I/L axillary LN
N_{2a}	Fixed I/L axillary LN
N_{2b}	Internal mammary LN, in absence of axillary LN
N_{3a}	Infraclavicular LN
N_{3b}	Internal mammary + axillary LN
N_{3c}	Supraclavicular LN
M staging	
M_0	No distant metastasis
M_1	Distant metastasis

Metastasis :

- m/c site : Bones → Lumbar vertebrae (m/c) d/t Batson's plexus.
- Bony metastasis : Osteolytic > osteoblastic.

Note :

Lobular carcinoma insitu (LCIS) : No longer an insitu cancer.

Breast Cancer Management

00:21:42

SURGERY

Breast Conservative Surgery (BCS)/Lumpectomy :

Tumour removal → With 1 mm margin.
→ F/b mandatory radiotherapy (D/t ↑local recurrence rate).

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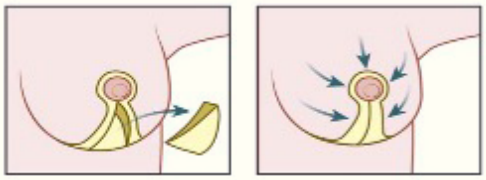
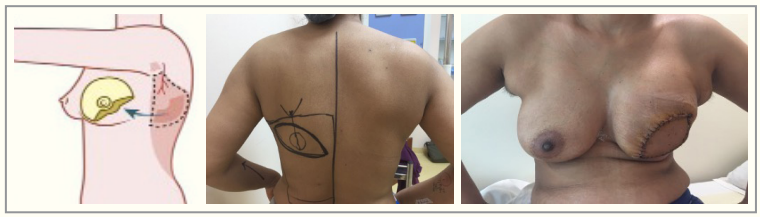
Oncoplasty :

Types of oncoplasty	Breast volume resected
Volume displacement (Round block technique)	10–15%
Volume replacement	>15%



Volume displacement

Round block technique



Volume replacement with Latissimus dorsi (LD) flap

C/I for BCS :

C/I for Radiotherapy (RT)	Technical C/I
• Pregnancy • Prior RT to chest wall • Collagen vascular disease (SLE, rheumatoid arthritis)	• Multicentric • Lobular cancer (If multicentric) • Large tumour : breast ratio • Locally advanced breast cancer (LABC) • Multifocal disease } Relative C/I

Mastectomy :

Radical/Halsted

Structures removed :
- Breast
- Nipple areolar complex (NAC)
- Pectoralis major & minor
- Level 1, 2, 3 axillary lymph nodes

Modified radical
- Elliptical Stewart incision
- Structures removed :
  - Breast + NAC
  - Pectoral fascia
  - Level 1, 2, 3 axillary lymph nodes (LN)
  - ± Pectoralis minor

Retracted : Auchincloss (m/c)

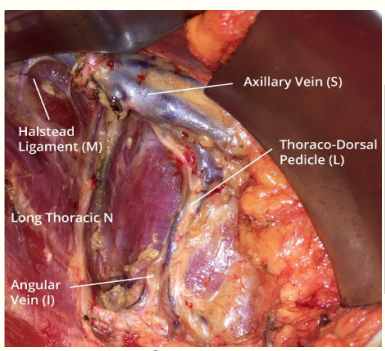
Cut : Scanlon, Patey

Simple
- Breast + NAC removed
- LN not removed
- If done in fungating breast cancer : Toilet/palliative mastectomy

Axillary LN Clearance :

Minimum LN removed : 10.

Nerves saved during Sx
• Medial pectoral nerve (Laterally located) • Lateral pectoral nerve (Medially located) • Long thoracic nerve :   – Not a boundary



Boundaries of axillary clearance

Key :
- S : Superior
- L : Lateral
- M : Medial
- I : Inferior

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Complications of Modified Radical Mastectomy (MRM) :

1. Hemorrhage.

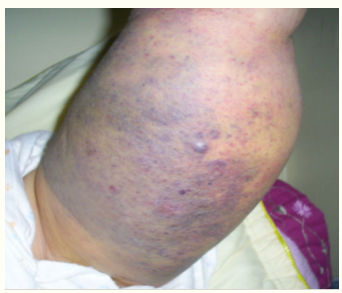
2. Injury to nerves :
   a. Intercostobrachial nerve (m/c nerve injured) :
      - Numbness + paraesthesia in axilla.
      - Phantom breast syndrome.
   b. Long thoracic nerve/Nerve of Bell :
      Winging of scapula.


Winging of scapula

3. Seroma (Fluid accumulation) :
   - m/c complication.
   - Prevention : Romovac drain.
   - Mx : Aspirate ↓ aseptic conditions.


Lymphedema

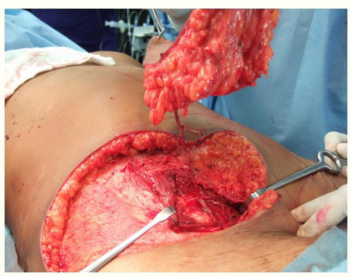
4. Lymphedema (Post-mastectomy) of upper limb :
   - m/c cause of upper limb lymphedema.
   - Develops weeks to months post Sx.
   - Long standing (8–10 years) : Angiosarcoma (AKA Stewart Treves syndrome) → Reddish or bluish nodules.
   - ↑ Incidence :
     - LN removed above axillary vein.
     - RT given to axilla after clearance.


Stewart Treves syndrome

5. Recurrence :
   - Local :
     - IOC : MRI.
     - Biopsy.
   - Diffuse : Cancer en curasse.


Local recurrence

Reconstructive Sx :

TRAM flap	DIEP flap
Transverse rectus abdominis myocutaneous flap	Deep inferior epigastric artery perforator flap (Best flap)
↑ abdominal wall morbidity (muscle removed)	↓ abdominal wall complications (muscle not removed)
	 

Sentinel Lymph Node Biopsy (SLNB) :

- 1st draining LN in cancer :
  Sentinel LN (1st described by Cabana).
- m/c nerve injured : Intercostobrachial nerve.

Identification :

1. Blue dye technique :
   - Isosulfan blue/methylene blue dye used.
   - Injected in periareolar region (Subcutaneous plane).
   - Complications :
     - Skin tattooing (m/c).
     - Anaphylaxis.
     - Bluish discolouration of urine.
2. Radionucleotide technique :
   Tc^{99} tagged sulphur colloid injected (Periareolar region)
   ↓
   Hot nodes (Radioactive) identified on gamma camera.
3. Indigocyanine green (ICG) :
   New method.
4. Dual technique (Best) :
   Radionucleotide + Blue dye or Blue dye + ICG.

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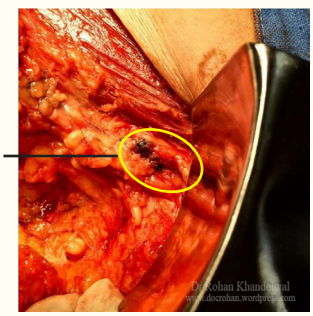
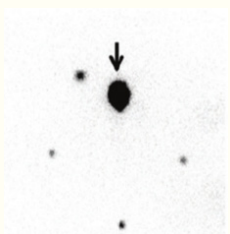
Cancers where SLNB used
• Malignant melanoma. • Breast cancer. • Penile cancer. • Vulval cancer. • Head & neck cancer.



Blue dye technique


Gamma camera


Hot node

ICG technique

CHEMOTHERAPY

Indications :
• LN ⊕. • LABC. • ER ⊖, PR ⊖ tumours. • HER 2 neu ⊕ tumours.

Neoadjuvant chemoRx (NACT) indications :
• LABC. • TNBC. • HER 2 neu ⊕. • Large tumour with patient desirous of BCS.

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Response Evaluation Criteria in Solid Tumours (RECIST) :

Single largest diameter (SLD) measured : Assess tumour shrinkage.

Complete response (CR)	Disappearance of all lesions + pathologic LN
Partial response (PR)	≥30% ↓ in SLD
Progressive disease (PD)	≥20% ↑ in SLD while/despite chemoRx or new lesions forming
Stable disease	Neither PR nor PD

Documenting stage (Tumour) after chemotherapy :

(y) (c) $T_a N_o M_o$

After neoadjuvant chemoRx ← → Clinical

Tip lies in SVC above right atrium

Chemoport (To deliver chemoRx medication)

Avoidance of Chemotherapy :

- Patient not fit for chemoRx/poor performance status (ECOG/Karnofsky).
- Early breast cancer (T_1, T_a/N_o/M_o) + Hormone ⊕ but HER 2 neu ⊖
  → Molecular tests show low risk
  → No chemoRx.

Molecular tests	
Oncotype Dx	21 gene assay
Mammaprint	70 gene assay
Endopredict	12 gene assay
PAM 50	50 gene assay
CAN assist (For Indian patients)	

RADIOTHERAPY

Indications :

- LN ⊕.
- Tumour >5 cm.
- LABC.
- After BCS.

HORMONAL RX

Only given in ER ⊕, PR ⊕ breast cancers.

	Premenopausal	Postmenopausal
Drug	Selective estrogen receptor modulator (SERM) : Tamoxifen	Aromatase inhibitor (Letrozole/anastrozole)
Duration	10 years	10 years
Side effects	Hot flashes (m/c), DVT, endometrial hyperplasia	Osteoporosis (m/c)

TREATMENT SUMMARY

Surgery	ChemoRx	RT	Hormonal Rx
• BCS —C/I→ mastectomy • If LN not enlarged : SLNB (↓Lymphedema incidence)	• LN ⊕, LABC, TNBC, HER 2 neu ⊕ • Molecular tests → Low risk + hormone ⊕ + HER 2 neu ⊖	Post BCS	ER ⊕ PR ⊕

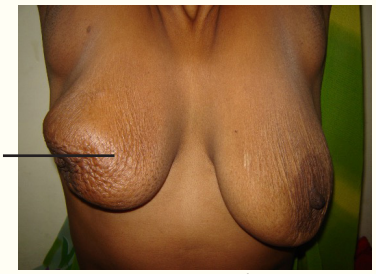
Special Breast Neoplasms

00:39:30 ----- Active space -----

LABC :

Definition :

- $T_3 N_1 M_0$
- Any T_4
- Any N_a } With M_0
- Any N_3



LABC (T_4 B)

Mx : NACT → MRM/BCS → RT.

Pregnancy Associated Breast Cancer :

- Develop during pregnancy/within 1 year of delivery.
- Aggressive tumours (usually ER, PR ⊖).

Ix : Core biopsy (Diagnostic).

Mx :

1. Sx → BCS in 2nd/3rd trimester only → RT after delivery
   → MRM (1st trimester)
2. Chemo → C/I in 1st trimester
   → Best : 2nd trimester
3. Hormonal Rx + RT : C/I in all trimesters.

Phyllodes Tumour/Cystosarcoma Phyllodes :

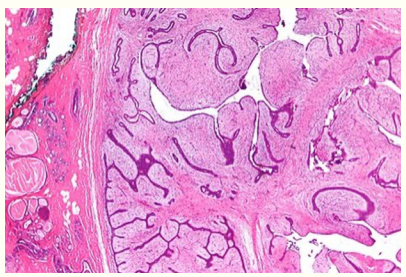
C/F :

- 3rd/4th decade.
- Rapidly enlarging breast lump.
- Dilated veins over chest wall.


Phyllodes tumor

Spread :

- <10% : metastasize to LN.
- Hematogenous spread (If malignant) : Lungs (m/c).


HPE of Phyllodes tumor

HPE : Arborizing pattern and slit-like cystic areas seen.

Mx :

Sx → Lumpectomy.
→ Simple mastectomy for malignant phyllodes, recurrence.

----- Active space -----

Benign Breast Conditions

00:42:11

MASTALGIA

m/c cause : Fibrocystic disease/fibroadenosis.

C/F : Cyclical mastalgia (↑before menses, settles after periods) + breast nodularity.

Cardiff-Lucknow scale : Assess nodularity.

Mx :

- Maintain pain diary.
- Reassure that it is not malignancy.
- Flaxseed/evening primrose oil.

→ 2 months, No benefit →

Rx of pain + nodularity :

- Tamoxifen
- Ormeloxifen

} m/c used

- Danazol

BREAST CYST

Simple cyst	Complex cyst	Complicated cyst
No solid component (BIRADS 2)	Solid component ⊕ (BIRADS 4a)	Intracystic floating debris (Infective)
Mx : Observation	Mx : Solid component biopsied (To rule out carcinoma)	Mx : Antibiotics

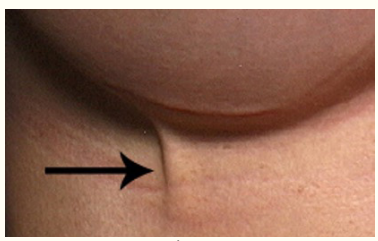
MONDOR'S DISEASE

- Thrombophlebitis of chest veins.
- Always rule out carcinoma.

C/F : Mastalgia, O/E : Cord-like swelling.

Risk : ↑in smokers.

Mx : Anti-inflammatory agents (Settles in few weeks).



Mondor's disease

NIPPLE DISCHARGE

Duct Ectasia :

- m/c pathological cause for nipple discharge.
- Dilated duct + greenish discharge.

Periductal Mastitis (Zuska's Disease) :

- Seen in perimenopausal (A/w smoking).
- Present with → Pain + greenish discharge.
  → Periareolar abscess/sinuses (Aerobic + anaerobic).

IOC : Ultrasound.

Mx : Antibiotic → (Not responding) → Sx : Hadfield procedure (Cone excision of all affected ducts).

----- Active space -----

Duct Papilloma :

- Have central fibrovascular core + papillary projections (Epithelium and myoepithelial cells).
- M/C cause of bloody nipple discharge (From single duct).

Types →
- Solitary papilloma : Relative risk (RR) of cancer → 1.5-2.
- Papillomatosis (≥5 papillomas) : RR → ≥3.
- Juvenile papillomatosis : Multiple papillomas (Swiss cheese disease).

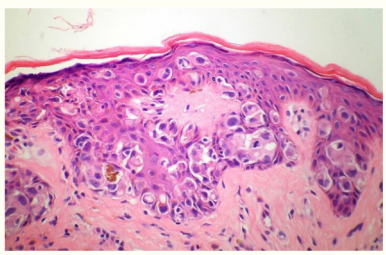
Ix : USG → Dilated duct + intraductal growth.

Mx : Microdochectomy (Single affected duct + lump removed).

Paget's disease vs Eczema :

Paget's disease	Eczema
Eczema like condition + itching	Itching
Entire NAC destroyed	No NAC destruction
U/L	B/L
• 70% patients have underlying lump : DCIS (M/C), invasive ductal cancer (Rare). • ER & PR ⊖ (Usually), CEA ⊕.	-
Mx of underlying carcinoma	Mx : Topical steroids

Paget's disease



Paget cells in epidermis

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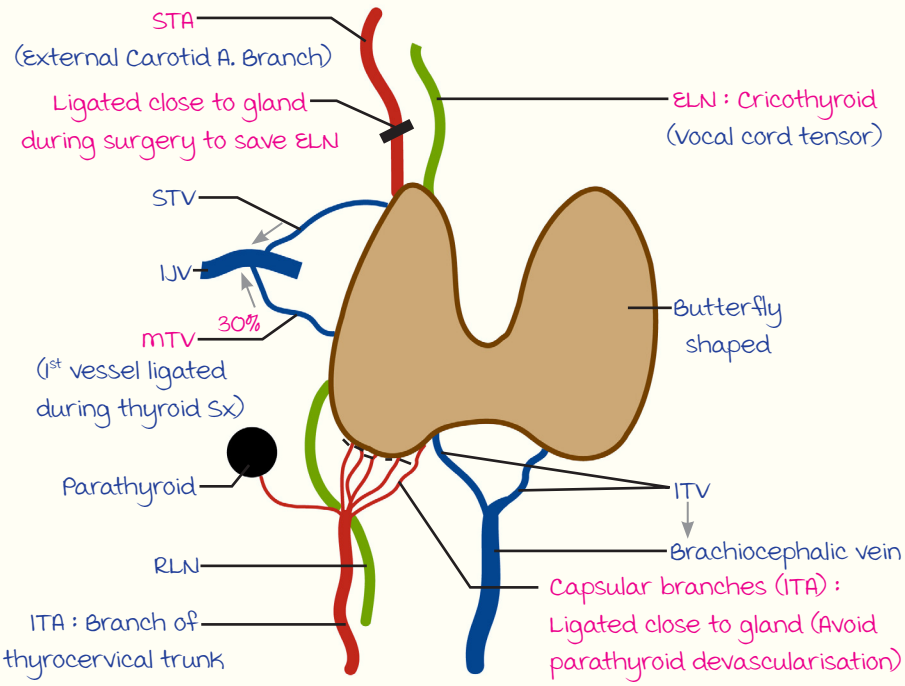
THYROID, PARATHYROID AND ADRENAL GLANDS

Thyroid Gland

00:00:49



Thyroid surgical anatomy

Key :
STA : Superior thyroid artery
ELN : External laryngeal nerve
STV : Superior thyroid vein
IJV : Internal jugular vein
MTV : Middle thyroid vein
ITV : Inferior thyroid vein
RLN : Recurrent laryngeal nerve
ITA : Inferior thyroid artery

Beahr's triangle boundaries

Note : Thyroid ima artery is a direct branch of aortic arch.

Berry's ligament :

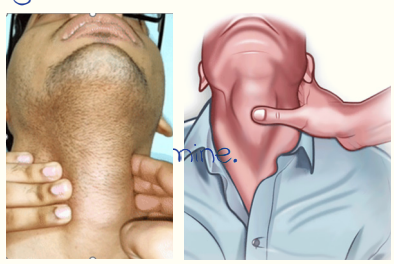
- Pre-tracheal fascia condensation (Attaches thyroid gland to trachea).
- RLN injured at this site during thyroid surgery.

Thyroid Examination :

Pizzillo's method : Patient's hand on the occiput & leans

Lahey's method : To feel margin of gland.

Crile's method : To palpate nodules.



Lahey's method Crile's method

Investigations in Thyroid Disorders

00:03:54

Thyroid function test :

- 1st Investigation done
- T_3, T_4, TSH
- Anti-thyroid antibodies

TSH N/↑ → USG Neck → FNAC (IOC) : Cannot differentiate b/w follicular adenoma v/s carcinoma.

TSH ↓ → Thyroid scan.

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Thyroid USG :

Features of malignant thyroid nodule :

- Hypoechoic.
- Border irregularity.
- microcalcifications.
- ↑Intranodular vascularity.

Note : Gross features → Taller > wider.
→ Abnormal cervical lymph nodes (Round shape + Loss of fatty hilum).

TI-RADS Score : TR3, TR4, TR5 lesions only → FNAC

Thyroid Fine-Needle Aspiration Cytology (FNAC) :

Royal College of Pathologist Classification :
(Similar to Bethesda classification)

FNAC Report	Inference	Management
Thy 1	Non diagnostic	Repeat FNAC under USG guidance
Thy 1c	Non diagnostic cystic	
Thy 2	Non neoplastic (Benign)	Follow up
Thy 3	Follicular	Hemithyroidectomy
Thy 4	Suspicious of malignancy	Surgery
Thy 5	Malignant	

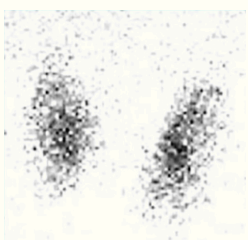
Criteria for specimen :

At least 6 groups of follicular cells → Each group composed adequacy of at least 10 cells on a single slide.

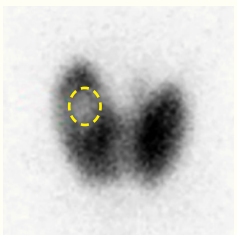
Thyroid Scan :

Isotopes : Technetium 99/Iodine 123.

Indications → Features of hyperthyroidism & ↓TSH.
→ Ectopic or aberrant thyroid tissue.

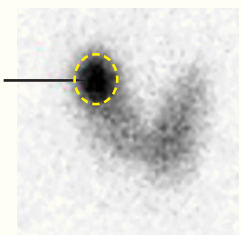


Normal Scan

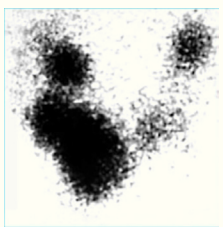


Cold Nodule :
- Non-functioning
- ↑Malignancy risk (20%)

Solitary Toxic Nodule

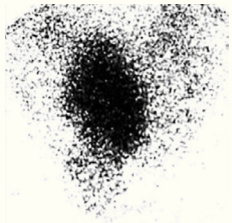


Hot Nodule :
- Hyperfunctioning
- Malignancy risk : 4%

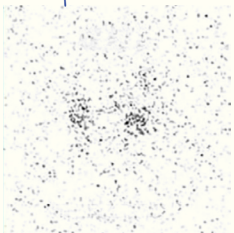


Toxic Multinodular Goitre (Plummer's Disease) : multiple hot nodules

Graves Disease (Diffuse ↑uptake)



Toxic Adenoma



Thyroiditis : (Diffuse ↓uptake)

----- Active space -----

Thyroglossal Cyst

00:10:30

- Persistent thyroglossal tract.
- m/c location : Subhyoid.
- Long standing thyroglossal cyst → Papillary Thyroid Carcinoma

C/f : Midline swelling moves on → Deglutition. / Tongue protrusion.

IOC : FNAC.

Mx : Sistrunk Surgery

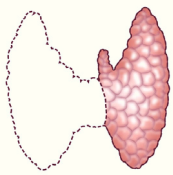
Removal of cyst + part of hyoid bone + tract till base of tongue.

(I & D : C/I → Can cause thyroglossal fistula).

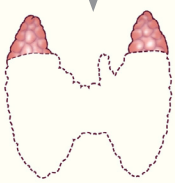
Thyroglossal Cyst

Thyroidectomy

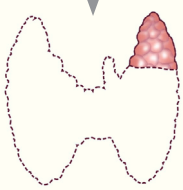
00:12:16



Hemithyroidectomy
(Lobectomy + isthmusectomy)



Subtotal thyroidectomy



Near-total Thyroidectomy
(Hartley-Dunhill procedure)

Total thyroidectomy
(Removal of both lobes + Isthmus)

Not done presently

Difficult to redo surgery in case of recurrence.

Incidence of hypothyroidism, RLN injury, and hypoparathyroidism : Equal in all types of surgery.

Open Thyroidectomy :

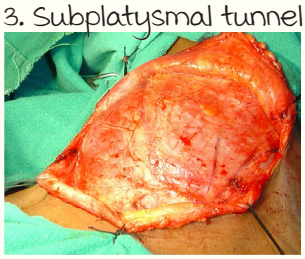
1. Rose position

Neck extended + 30° head elevation (Exposing incision site).

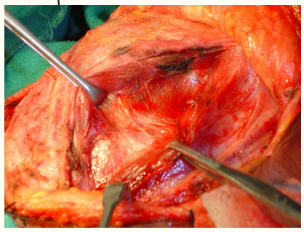
2. Collar incision

Incision : Just 2 finger breadths above the suprasternal notch.

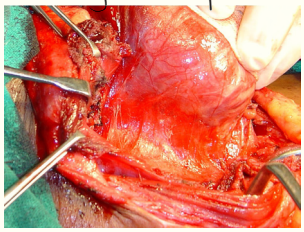
3. Subplatysmal tunnel



4. Strap muscles retraction

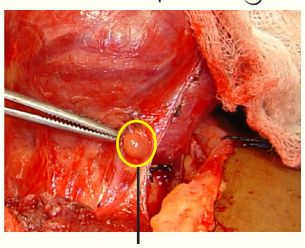


5. Cutting of strap muscles



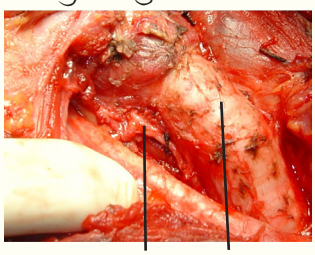
- To expand surgical field.
- If strap muscles cut : Done high up (To prevent ansa cervicalis injury).

6. Localization of parathyroid gland



Yellowish d/t
Sentinel pad of fat.

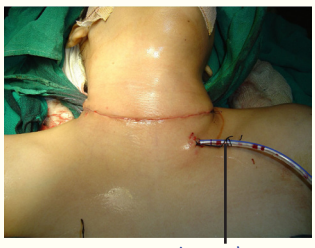
7. Thyroid gland removal



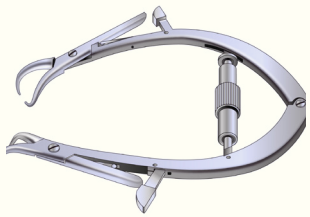
RLN Trachea

----- Active space -----

8. Incision closure



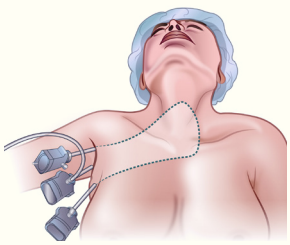
Romovac suction drain



Joll's thyroid retractor

Minimally Invasive Video-Assisted Thyroid Surgery (MIVAT) :

Approaches	Indications
• Transaxillary (m/c) • Trans-oral • Retroauricular • Nipples	• <3 cm nodule • T_1 papillary thyroid cancer • Parathyroid adenoma



MIVAT

Complications of Thyroid Surgery :

1. Hemorrhage.

2. Nerve injury :

External laryngeal nerve	Recurrent laryngeal nerve
m/c, goes unnoticed	Less common
U/L or B/L : Hoarseness/inability to speak at high pitch (Not life threatening)	U/L : Hoarseness of voice B/L : Stridor, aphonia, breathlessness (Life threatening)

3. Post-operative respiratory distress :

- Laryngeal edema : m/c cause.
- Tension hematoma → Mx : Open sutures → Evacuate hematoma.
- Reactionary hemorrhage.
- Laryngomalacia.
- Bilateral RLN injury.
- Hypoparathyroidism : Late cause (>48-72 hours after surgery).

----- Active space -----

Hypoparathyroidism :

D/t vascular insult (ITA) to the gland during surgery.

C/f : Perioral numbness (Initially) → Tetany (Trousseau sign ⊕ & Chvostek sign ⊕)

Respiratory muscle paralysis (m/c cause of death) ← Respiratory distress

Mx : Monitoring symptoms, serum calcium & serum PTH levels.

Presentation	Management
S. Ca^{2+} >8 mg/dL + Minor symptoms	Oral Ca^{2+} + Oral vitamin D_3
S. Ca^{2+} <8 mg/dL (OR) Major symptoms	IV Calcium Gluconate + Oral Ca^{2+} + Oral vit D_3

Thyroid Cancers

00:21:41

F > M.

Syndromes associated with thyroid cancers :

Type	Syndrome	Gene
Medullary	MEN 2	RET
Follicular	Cowden syndrome	PTEN
	Werner syndrome	WRN
Papillary	Familial Adenomatous Polyposis	APC
	Cowden Syndrome	PTEN

Differentiated Thyroid Cancer (DTC) staging updates :

(DTC includes : Papillary, follicular, hurthle cell ca.)

- Age cut off : Age at diagnosis <55 years (Good prognosis).
- T3 → T_{3a} : Tumor >4 cm confined to thyroid gland.
  → T_{3b} : Strap muscles involvement.
- Anaplastic cancers will now use the same 'T' definitions as DTC (Previously classified as T4 disease).

Papillary Thyroid Carcinoma (PTC) :

m/c Thyroid cancer, F > M, Best prognosis.

Risk factors :

- Radiation exposure to neck → more aggressive tumour arises.
- Long standing thyroglossal cyst.
- Genetic : BRAF gene (m/c involved).

Features : Thyroid swelling → multifocal (usually).

Spread : Lymphatic → Level 6/Delphian LN > Hematogenous → Lungs (m/c site).

Lateral aberrant thyroid : Palpable LN d/t mets from PTC.
Thyroid incidentaloma : Incidentally detected <1 cm tumour.

Lindsay tumour
Follicular variant of PTC.

----- Active space -----

Histology of PTC :

- Orphan annie eye/Coffee bean nuclei.
- Intranuclear inclusions.
- Psammoma bodies.

Note : Psammoma bodies also seen in
- Serous cystadenocarcinoma ovary.
- Meningioma.
- Papillary RCC.

Surgical Approach for DTCs :

	Indications
Hemithyroidectomy	• Low risk, unilateral DTC • DTC b/w 1-4 cm • No extrathyroidal extension
Total thyroidectomy (TT)	• Radiation induced DTC • Familial non-medullary thyroid Ca • Multifocal B/L DTC • Extra-thyroidal extension
TT + Central Neck Dissection (CND)	Level 6 lymph nodes ⊕
Prophylactic CND	T3, T4 disease ⊕
TT + CND + Modified Radical ND (MRND)	Other nodes ⊕

Post-Operative Mx :

Traditional → wait 4-6 weeks
New → Recombinant TSH given
→ ↑TSH (>20 IU/L) → Whole body I_a scan : Residual disease or metastasis
- ⊕ → Radioiodine ablation (I^{131}) → F/b
- ⊖ → Life long follow-up :
  1. Thyroxine (TSH suppression)
  2. USG neck & s.Tg (6 monthly)

Note : Serum thyroglobulin (s.Tg)
- → Tumour marker for all DTCs.
- → If >2 ng/mL : Suspect recurrence.

Radioiodine ablation (I^{131}) :

- $T_{1/a}$: 8 days, acts via β-rays
- Indications : Residual disease ⊕, Lymph nodes ⊕, metastasis ⊕.

Follicular Thyroid Carcinoma (FTC) :

2nd m/c thyroid cancer, F > M, 2nd best prognosis.

Risk factors :

- Long-standing multinodular goitre (Rapid ↑size).
- Genetics
  - → PTEN & BAX gene mutations.
  - → Up-regulation of miRNA 197, 346.

FTC : Bony metastasis

----- Active space -----

Spread :

- Hematogenous : Bones (m/c site) → may be pulsatile (D/t vascularity).
- Lymph node (LN) : Level 6.

Mx :

FNAC —Reports→ Follicular Neoplasm (Thy3) → Hemithyroidectomy f/b frozen section
(For diagnostic confirmation of Carcinoma)
⊕ → Sx approach for DTC + Post Op Mx.
⊖ → Close up.

Hurthle Cell Carcinoma :

- Earlier considered to be a variant of FTC.
- Seen : Elderly (6–7th decade of life).
- HPE : Oxyphilic Hurthle cell ⊕ (Mitochondria rich).
- More aggressive than FTC.
- Less radioiodine avid than other DTC.

Prognostic Indicators of DTCs :

AGES system	AMES system	MACIS (Post-operative score)
• Age • Histologic Grade • Extrathyroidal invasion • Size	• Age • Metastases • Extrathyroidal spread • Size of tumours	• Metastases • Age • Completeness of original Sx resection • Extra thyroidal Invasion • Size of original lesion

Anaplastic Carcinoma Thyroid :

L/C, seen in 5–7th decade of life, worst prognosis.


Anaplastic Thyroid Ca

C/f :

- Rapidly enlarging swelling.
- Hoarseness of voice (RLN involved).
- Stridor (Tracheal compression).

Mets : Lungs (m/c)

Genetic risk factor : p53 mutation.

Mx :

Restricted to thyroid : Aggressive Sx.

Extrathyroidal spread :
- Palliative Mx.
- Tracheal compression : Isthmusectomy.

----- Active space -----

Medullary Thyroid Carcinoma :

Origin : Parafollicular 'C' cells (From ultimobranchial bodies of neural crest).
↓ (Do not take up iodine)
Calcitonin produced (Tumor marker of MTC).

MEN-2B Syndrome
• most aggressive MTC. • Seen in young patients. • Multifocal.

Etiology : Sporadic > Familial (A/w MEN-2 syndrome).

Features : Thyroid swelling ± diarrhea, aggressive tumors.

Spread : Lymphatic (Level 6 LN) + Hematogenous (m/c : Liver).

HPE : Amyloid rich stroma.

IOC : FNAC.

Surgical Mx	Indication
TT + CND	MTC restricted to thyroid
TT + CND + MRND	Thyroid tumor + level 6 LN
TT + CND + B/L MRND	Thyroid tumor + level 6 LN + other nodes
Vandetinib, Carbozantinib	metastases ⊕

Note :
- Always rule out pheochromocytoma before Sx.
- No role of thyroid scan & radioactive iodine.

MEN Syndromes 00:39:10

Multiple Endocrine Neoplasia (MEN) I Syndrome :

AKA Wermer Syndrome.

- Pituitary adenomas : Prolactinoma (m/c type in MEN-I).
- Parathyroid adenoma (m/c presentation in MEN-I) > Hyperplasia.
- Pancreatic endocrine tumors : Gastrinoma (m/c in MEN-I).

} Mnemonic : 3Ps.

Other tumors : Thymic tumors, collagenomas, adrenal cortical tumors.

MEN 2 Syndrome :

MTC only	MEN 2A/Sipple syndrome	MEN 2B/MEN 3 syndrome
Exon 618 mutation	Exon 634 mutation	Exon 918 mutation
MTC only	• MTC (m/c) • Parathyroid adenoma • Pheochromocytoma • Megacolon	• MTC (m/c), most aggressive • Marfanoid feature • Mucosal neuromas • Megacolon • Medullated corneal nerve fibres
Prophylactic thyroidectomy should be done by 5-6 years of age.		Prophylactic thyroidectomy should be done by 1 year of age.

MEN 4 Syndrome :

- CDKN1B gene mutation on chromosome 12.
- Can develop pituitary adenomas and parathyroid adenomas, renal tumors, adrenocortical tumors, reproductive organ tumors.

----- Active space -----

Hyperthyroidism

00:43:21

Clinical features	Causes
• Thin & irritable • Weight loss despite good appetite • Tachycardia • Diarrhea • Tremors • Heat intolerance	• Grave's disease : m/c cause • Solitary toxic nodule • Toxic nodular goitre • Factitious hyperthyroidism : ↑Exogenous thyroxine intake • Jod-Basedow phenomenon : I_a induced hyperthyroidism • TSH secreting pituitary adenoma • Struma ovarii : Thyroid tissue in ovary (Usually malignant)

Mx :

1. Drugs only → Propyl thiouracil (PTU) : Safe in 1st pregnancy. / Carbimazole } S/E : Agranulocytosis.
2. Drugs f/b radioactive iodine (I^{131}).
3. Drugs f/b Sx (Inadequate preparation prior Sx → Thyroid storm).

Preparation of a hyperthyroid patient for surgery :

- Start anti-thyroid medications 6-8 weeks before surgery.
- Long acting beta blockers should be given : Nadolol.
- Last dose of anti thyroid medication is to be given evening before surgery.
- Beta blockers continued for 7 days post surgery.

Grave's Disease :

- 1° thyrotoxicosis, autoimmune condition.
- Auto antibodies : Long acting thyroid stimulating antibodies.

Associated with : Pernicious anemia, myasthenia gravis.

Pretibial myxedema

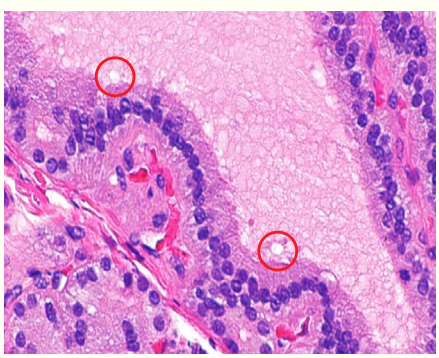
Exophthalmos

Clinical Features :

- Diffuse enlargement of gland.
- Hyperthyroidism, pretibial myxedema.
- Eye Signs (Classical) :
  - Stellwag sign → Infrequent blinking. / Earliest and m/c sign.
  - Von Graefe sign : Lid Lag
  - Dalrymple sign : Lid retraction } D/t spasm of muller's muscle.
  - Joffroy sign : No forehead wrinkling on looking up
  - Moebius sign : Loss of accommodation reflex (Severe toxicity)

HPE :

- Scalloping of colloid.
- Tall columnar cells.



Scalloping of colloid with tall columnar cells

Management :

----- Active space -----

Patient's status		Mx
Children		Drugs only
Pregnant		Anti-thyroid drugs (1st trimester : Only PTU)
Adult	Without goitre	Drugs f/b radio iodine ablation
	With goitre	Drugs f/b Sx (Near total/total thyroid Sx)
Elderly with co morbidities		Drugs f/b radio iodine ablation (RIA)
Patients with eye signs		Drugs f/b Sx (RIA worsens eye signs)

Hypothyroidism

00:50:00

Clinical Features	Causes
• Dull • Slow, lethargic • Cold intolerant • Bradycardia • Constipation • Weight gain	• Iodine deficiency : M/c cause overall. • Hashimoto's thyroiditis : M/c in western world. • Wolf-Chaikoff effect : I_a induced hypothyroidism. • Non-functioning pituitary adenoma.

	Hashimoto's/Lymphocytic Thyroiditis	De Quervain's/Viral Granulomatous Thyroiditis	Riedel's Thyroiditis
Etiology	Autoimmune A/w : • Down's Syndrome • Turner Syndrome	• H/O URTI ⊕ • A/w HLA B35 • Subacute	• IgG_4 mediated • Fibrous deposition in and around the gland.
C/f	Painless neck swelling Course : Hashitoxicosis (↑T3, ↑T4 briefly) ↓ Prolonged hypothyroidism	Painful neck swelling Course : Hyperthyroidism → Hypothyroidism Spontaneous recovery → Euthyroid	Painless neck swelling • Woody hard gland • Hoarseness of voice (RLN involvement) • Stridor (Tracheal compression)
Ix	1. Autoantibodies (Diagnostic) against : – Thyroid receptor (Blocking) – Thyroglobulin – Thyroid peroxidase 2. HPE : Lymphocytic infiltration	↑ESR	Trucut biopsy : To rule out anaplastic thyroid cancer.
Rx	1. Thyroxine replacement 2. Surgery (Diffuse goitre ⊕)	Supportive care	Steroids, Tamoxifen

Note :

- Hashimoto's thyroiditis → ↑Risk of FTC, lymphoma.
- Postpartum thyroiditis : Subacute, painless.

----- Active space -----

Goitre

00:55:16

Thyroid gland enlargement.

Types :

1. Diffuse :

Seen in :

- Puberty, Pregnancy.
- Hashimoto's thyroiditis
- Graves disease.
- Iodine deficiency (Initial phase).

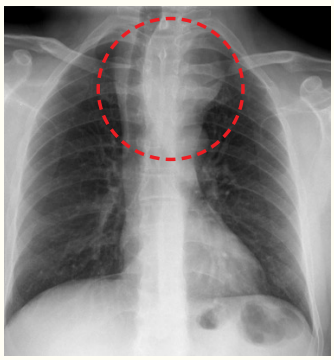
2. Multinodular :

Seen in :

Long-standing I_2 deficiency (Variable gland stimulation by TSH).

Retrosternal Goitre :

	1° mediastinal	2° Retrosternal
Features	Ectopic thyroid tissue in mediastinum	• m/c • Starts in neck → Goes behind sternum (Plunging goitres).
Blood Supply	mediastinal vessels	Neck vessels (Neck incision made → Ligate neck vessels, gland removed easily)



CXR : Retrosternal goitre

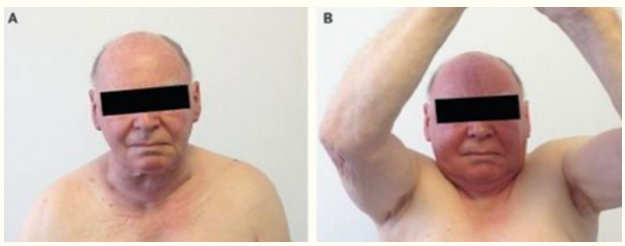
Clinical features : Dyspnoea, stridor, Pemberton sign.

Ix : CECT Neck/Thorax (IOC).

Mx : Surgery → Neck only (Cervical only).
↓ Fails
Median sternotomy.

Other Indications of Median Sternotomy :

1° mediastinal goitre, large malignant retrosternal goitre, recurrence in mediastinum.



Pemberton Sign : Facial congestion on raising hands above head

Hyperparathyroidism

00:57:09

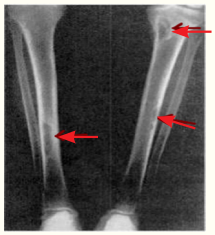
Embryology of parathyroid glands :

- Superior parathyroid : 4th pharyngeal arch.
- Inferior parathyroid : 3rd pharyngeal arch.

Clinical Features :

1. Bones : Pathological #, Brown tumours (Von Recklinghausen disease of bone).
2. Stones : Multiple + recurrent renal stones (m/c feature).


Osteitis fibrosa cystica/Brown tumors


Sub periosteal resorption


Salt and pepper skull

----- Active space -----

3. Abdominal Groans : Colicky abdominal pain, pancreatitis.
4. Psychiatric Overtones.

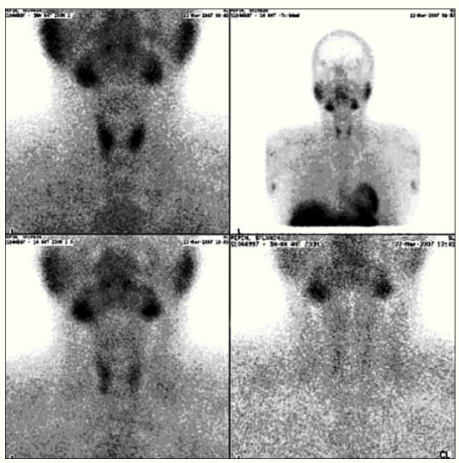
1° Hyperparathyroidism :

Adenoma > Hyperplasia

Ix → Biochemical : s.PTH ↑, s.Ca^{2+} ↑, s.PO_4^{3-} ↓, urinary Ca^{2+} ↑, urinary PO_4^{3-} ↑.
→ Imaging : Sestamibi scan (Best type : SPECT → Localises parathyroid gland).

Mx :

- Sestamibi scan
  - Adenoma → Remove affected gland (Miami criteria done).
  - Hyperplasia
    - $3^{1/2}$ gland removed.
    - 1/2 gland autotransplanted in brachioradialis (m/c) of forearm of non-dominant hand. (If recurrence ⊕ : Easy removal)


Sestamibi Scan

Miami Criteria (Intra-op PTH assay)
Pre-op PTH level → (10–15 mins after Sx) → PTH level ↓ by >50% → Correct gland removed.

2° Hyperparathyroidism :

↑PTH ⊕→ Parathyroid hyperplasia, reversible condition.

Causes :

- Chronic Renal Failure (CRF).
- Defective intestinal absorption.
- Lithium intake.
- Vitamin D_3 deficiency

Mx :

- Correction of CRF.
- Vit D_3 Supplement.
- Low phosphate diet.
- Cinacalcet.

----- Active space -----

Pseudohyperparathyroidism :

AKA Hypercalcemia of malignancy.

m/c paraneoplastic syndrome → PTH related peptide mediated A/w

- SCC lung.
- Metastatic :
  - Prostate Ca.
  - Breast Ca.

C/f : Altered Sensorium & dehydration.

Mx :

- IV fluids (1st line) F/b → Diuretics (Lasix).
- DOC : Bisphosphonates (When RFT Ⓝ and urine output adequate).

Adrenal Incidentaloma

01:04:06

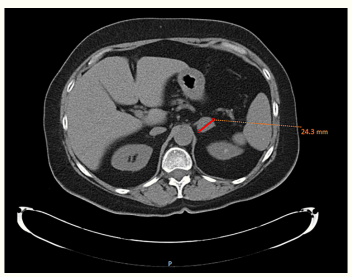
Incidentally detected adrenal tumour.

Workup :

- Serum cortisol
- Plasma free metanephrines (To rule out phaeochromocytoma)
- Serum DHEA
- Dexamethasone suppression test (Cushing's syndrome)
- Urinary cortisol

⊕ → Functional Tumour : manage accordingly.

⊖ → Non-functional tumour : MRI (Check for malignancy).

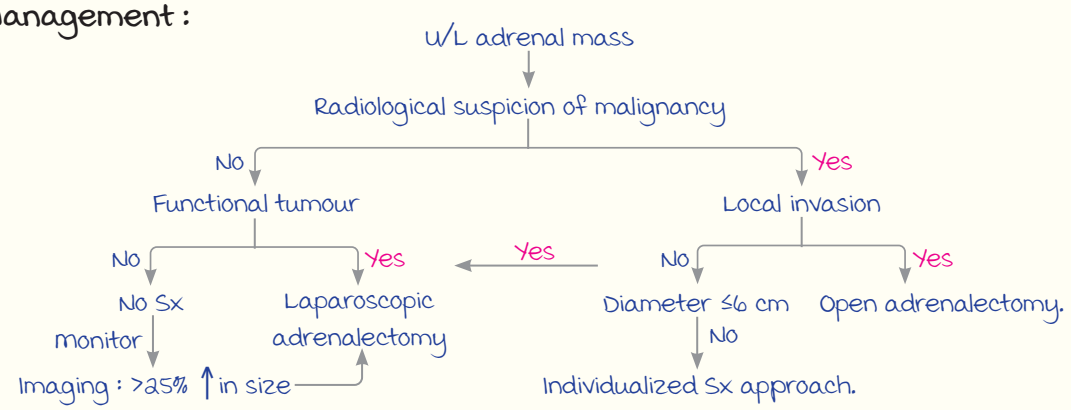


Adrenal incidentaloma : CT

Radiological features suspicious of malignancy are :

- Diameter >4 cm and density >10 HU.
- CECT : Wash out.
- MRI chemical shift : No change in signal intensity on out of phase imaging.
- FDG PET : Positive uptake.

Management :



Phaeochromocytoma

01:06:41

----- Active space -----

- Tumour of adrenal medulla.
- Paraganglioma → Extra adrenal phaeochromocytoma.
  → m/c site : Organ of Zuckerkandl (Sympathetic Chain).

Rule of 10
10 % familial
10 % bilateral
10 % malignant
10 % extra adrenal
10 % in children

Associated Syndromes
• MEN 2 (m/c)
• Neurofibromatosis-1
• Von-Hippel-Lindau Syndrome
• Familial paraganglioma syndrome

Clinical Features :

- Headache (m/c symptom).
- Sweating.
- Episodic HTN (m/c sign) in young patients.

Note : Young onset HTN D/D → Hyperthyroidism, renal artery stenosis, polycystic kidney disease, phaeochromocytoma.

Gross Appearance :

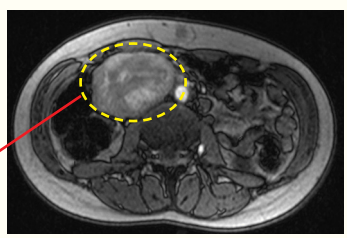
- Tan brown colour.
- Areas of necrosis & hemorrhage.

Investigations :

Screening test : 24 hr Urine VMA (Vanillyl mandelic acid).

IOC : Serum plasma free metanephrines.

Imaging IOC : MRI (Light bulb sign).



Phaeochromocytoma : MRI

IOC Extra adrenal phaeochromocytoma : Gallium dotatate scan.

Mx :

- α blockade $\xrightarrow{F/b}$ β blockade.
  Phenoxybenzamine (α blocker) → ↑Dose gradually till postural hypotension ⊕
- Sx : Laparoscopic/Open adrenalectomy.
  (Open Sx if malignancy ⊕).

Neuroblastoma

01:10:23

Features :

- m/c abdominal malignancy in children : Neuroblastoma > Wilms tumour.
- m/c age : <5 years.

Site : Adrenal medulla > Sympathetic chain.

Genetics : n-myc amplification.

----- Active space -----

Clinical Features :

- Abdominal lump crossing midline (Wilm's tumour : Does not cross).
- >50% present with metastasis.

Metastatic features :

Blueberry muffin lesions on skin (Characteristic)

Racoon eyes

Ix :

IOC : MRI (Tumour site, intratumoral calcifications ⊕).

Mx :

Chemotherapy and Sx.

Carcinoids

01:12:14

AKA Neuroendocrine tumours (NET) → New term.

Site : Appendix > Small bowel.

Types :

	Foregut/Bronchial Carcinoids	Midgut Carcinoids	Hindgut Carcinoids
Site	Stomach, duodenal	Appendix, ileum	Colon, rectum
Metastases	Lungs (m/c)	Liver	Liver
Argentaffin	⊖	⊕	
Serotonin	⊖	⊕ metabolised in Liver	
Carcinoid Syndrome	Uncommon	If liver metastasis ⊕	

Features :

- Cutaneous flushing (m/c symptom).
- Abdominal pain, sweating.

Carcinoid syndrome :

Serotonin enters in circulation → Bronchospasm.
→ Right heart valve involved : Tricuspid valve (m/c)

Investigations :

Urine : 5-Hydroxy indole acetic acid (5-HIAA).

Blood : Serum chromogranin.

Imaging → CECT.
→ Serotonin receptor Scintigraphy. (Localise tumour)

----- Active space -----

Management :

Sx → F/b Ki67 → If ↑ levels → Malignant NET → Require Chemo Rx.

Ki67 : Proliferation Index marker.

Appendicular carcinoid Mx :

- <2 cm, away from base → Simple appendicectomy.
- >2 cm, close to base → Right hemicolectomy.

----- Active space -----

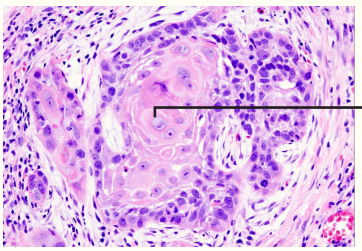
ORAL CANCER, SALIVARY GLANDS & NECK SWELLINGS

Oral Cancers

00:00:35

FEATURES

- m/c site (Overall) : Lateral border of tongue.
- m/c site (India) : Gingivo-buccal sulcus.
- m/c gene mutation : p53.



HPE : Squamous cell carcinoma (SCC)

RISK FACTORS

- Smoking.
- Alcohol.
- Betel quid.
- Immunosuppression.
- Sharp, ill – fitting denture.
- Chronic infections (HPV : Oropharyngeal SCC >> Oral SCC).

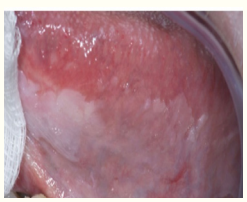
Note : EBV a/w nasopharyngeal cancer.

PRE-MALIGNANT CONDITIONS

Risk factors for malignant transformation in pre-existing dysplastic lesions :

- Female sex.
- Non-smoker.
- Lesion specific :
  - Size > 200 mm^2.
  - Non-homogenous.
  - Multiple.
  - Site : Lateral border of tongue/floor of mouth.

Dysplastic lesions :

	Leukoplakia	Erythroplakia	Chronic submucous fibrosis
Features	• White patch (Cannot be rubbed off). • ↑ Risk of cancer by 3 – 5 times.	• Red patch. • ↑ Risk of cancer by 6 – 9 times. • Most aggressive form : Speckled.	• Hypersensitivity reaction to betel nuts . • Inadequate mouth opening d/t fibrous deposition in oral cavity.
Mx	• Stop risk factors for oral cancer. • Biopsy (Confirmatory).		Intra-lesional triamcinolone.
Appearance			

Other conditions ↑ risk for malignancy :

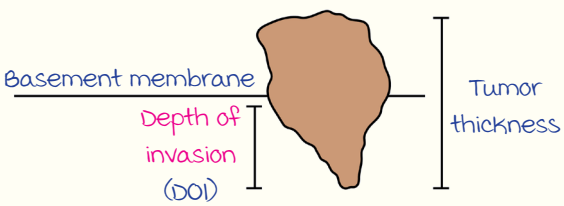
- Chronic hyperplastic candidiasis.
- Oral lichen planus (Ulcerative).
- 2° Syphilis.
- Plummer-Vinson Syndrome (aka Paterson Kelly Brown Syndrome/ Sideropenic dysphagia) :
  - Seen in perimenopausal women.
  - C/f : a. Iron deficiency anemia (Koilonychia ⊕).
    b. Angular stomatitis & glossitis.
    c. Post cricoid web or upper esophageal webs.
  - ↑Risk (d/t webs) → SCC esophagus.
    → Hypopharyngeal cancer.

Note : Oral candidiasis → White patch can be rubbed off (Leaves reddish border).

INVESTIGATIONS

Biopsy :

- Edge/wedge biopsy (Centre avoided d/t necrotic tissue).
- Pattern of invasion : (DOI is a prognostic factor).



Staging :

T stage	
Stage	Size (cm) + DOI (mm)
T1	≤ 2 + ≤ 5
T2	≤ 2 + 5 to 10 (or) 2 to 4 + ≤ 10
T3	> 4 (or) > 10
T4	Invasion of adjacent structures

		N stage
N0		No Lymph node (LN) involved
N1		Single I/L LN ≤ 3cm in size
N2	N2a	Single I/L LN 3 – 6 cm in size
	N2b	Multiple I/L LN, all ≤ 6 cm in size
	N2c	Any B/L (or) C/L LN, all ≤ 6 cm in size
N3	N3a	Any LN > 6 cm + ENE ⊖
	N3b	Any ENE ⊕ (Clinical/radiological)

Note :

- Clinical extra nodal extension (ENE) → matting, skin fixity.
- m/c site of distant metastasis : Lungs.

----- Active space -----

TREATMENT

- Surgery :
  - Wide local excision (0.5 cm margin).
  - Mandibular resection (If involved).
  - Neck dissection (Lymph node clearance).

  } Commando procedure f/b reconstruction
- Chemotherapy.
- Radiotherapy.

Neck Dissection (ND) :

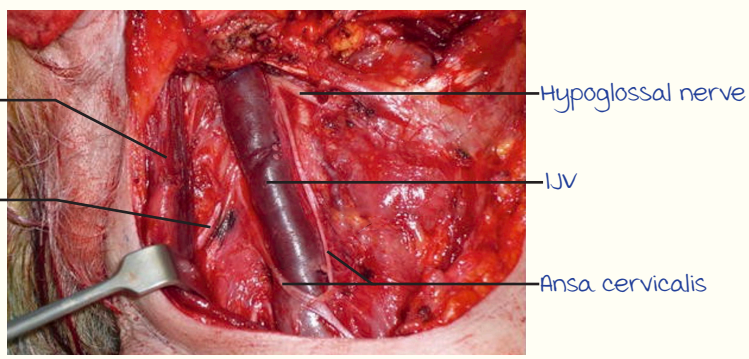
Incision : Modified Schobinger's incision (MRND).

Types :

Radical ND (Given by Crile)	Modified radical ND (MRND)	Selective ND
Structures removed		
• Level I–V LN + 3 extra-lymphatic structures : – Sternocleidomastoid (SCM) – Internal jugular vein (IJV) – Spinal accessory nerve (SAN) + • Submandibular gland. • Tail of parotid.	• Level I–V LN + At least 1 extra-lymphatic structure saved. – Based on structure saved : a) MRND I : SAN. b) MRND II : SAN + IJV. c) MRND III : All 3 saved (Functional ND). • Submandibular gland. • Tail of parotid.	• Central ND : Level 6 LN (Delphian LN). • Supra omohyoid ND (SOHND) : Level I, II and III. • Extended SOHND : Level I, II, III and IV.

Note : T1/T2 lesions → Sentinel lymph node biopsy (SLNB).
→ Prophylactic ND (SOHND) → Better prognosis.

Modified Schobinger's incision



Post MRND III : Intraoperative field

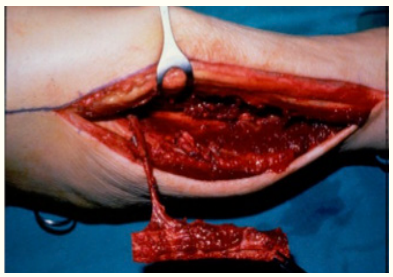
Complications :

- Haemorrhage.
- Carotid artery blowout : Maximum mortality.
- Nerve injury :
  - Marginal mandibular nerve/ramus mandibularis (M/C injured) :
    - Causes drooping of angle of mouth.
    - Prevention : Incision should be 2 finger breadth below the mandible.
  - Spinal accessory nerve → Shoulder dysfunction.

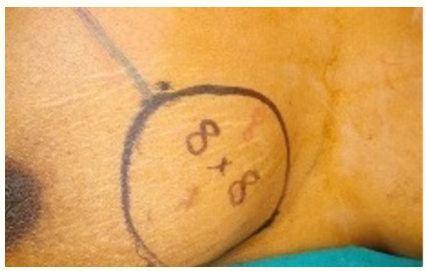
----- Active space -----

Flaps for Reconstruction :

1. Deltopectoral flap
2. Pectoralis major myocutaneous flap (PMMF) : m/c used by head and neck surgeons.
3. Radial artery forearm flap :
   - m/c used free flap + most versatile.
   - Allen's test done prior.
4. Free fibular flap : mandibular reconstruction.



Free fibular flap



PMMF

Radial artery forearm flap

Deltopectoral flap

Adjuvant Therapy :

Indications → High risk features :

- Major : ENE, margins involved ⊕/⊖.
- Minor :
  - Close margins.
  - Multiple nodes involved.
  - Largest node > 3 cm.
  - Lymphovascular invasion (LVI).
  - Peri-neural invasion (PNI).
  - T3/T4.

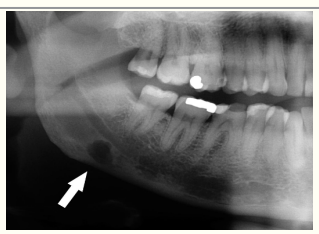
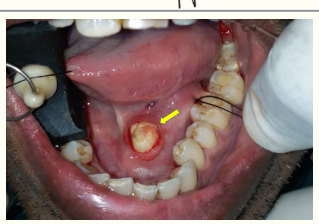
Modalities :

1. Radiotherapy : If 1 major ⊕ or 2 minor risk factors ⊕.
2. Concurrent chemo – radiation : Cisplatin-based regimen (High risk patients).
3. Immunotherapy : PDL – 1 inhibitors (Recurrent/metastatic SCC).

----- Active space -----

Benign Conditions of Salivary Glands

00:17:17

Condition	Description
Mucus retention cyst	• Blockade of minor salivary gland • Mx : Excision 
Ranula	Mucus extravasation cyst of sublingual salivary gland. • Site : Floor of mouth • C/F : Brilliantly transilluminant & fluctuant • Mx : – Cyst + sublingual salivary gland excision (Best Rx) – Marsupialization • Surgical Complications : – M/c injured structure : Submandibular duct – M/c nerve injury : Lingual nerve 
Plunging ranula	• Mucus retention cyst (sublingual + submandibular gland) • Mx : Excision of intra – oral swelling + neck swelling aspiration
Parotid abscess	• In immunocompromised patients • C/F : Painful swelling + fever on lateral parotid region • Mx : Incision + drainage (Avoid facial nerve injury) 
Stafne bone cyst	Mandibular cyst : M/c site of ectopic salivary tissue 
Recurrent parotitis in childhood	• Rapid swelling of 1/both glands • Aggravated by chewing • Symptoms for 1 week f/b quiescent period • Age : 3 – 6 years • X – ray : Snowstorm appearance • Rx : Long course of antibiotics + repeated endoscopic washouts  Snowstorm appearance
Sialolithiasis	• Submandibular > Parotid gland • Composition : Calcium phosphate • C/F : Post – prandial painful neck swelling • IOC : NCCT • Mx : Endoscopic mx $\xrightarrow{\text{fails}}$ Duct slitting $\xrightarrow{\text{fails}}$ Excision 

Salivary Gland Tumors

00:21:59 ----- Active space -----

- Benign tumours : Parotid > Submandibular > Sublingual > Minor
- Malignant : Minor > Sublingual > Submandibular > Parotid

Milan system for reporting salivary gland cytopathology :

Group		Diagnostic criteria	Management
I		Non-diagnostic	Repeat FNAC (IOC) with ultrasound guidance
II		Non-neoplastic	Follow up
III		AUS (Atypia of undetermined significance)	Repeat FNAC (Fine needle aspiration cytology) /Surgery
IV	IVA	Benign neoplasm	Surgery/follow up
	IVB	SUMP (Salivary gland neoplasm of uncertain malignant potential)	Conservative surgery
V		Suspicious of malignancy	Surgery
VI		Malignant	Surgery (Depending on extent)

PAROTID TUMORS

90 % Benign.

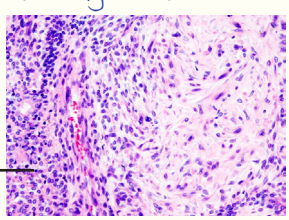
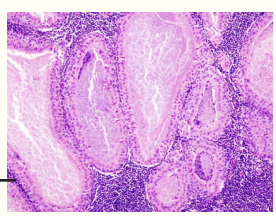
Clinical features :

- Lateral facial swelling → Lifts ear lobule.
- If deep lobe enlarged → Tonsillar fossa pushed medially.

m/c tumour : Pleomorphic adenoma.

m/c malignant tumour : Mucoepidermoid carcinoma.

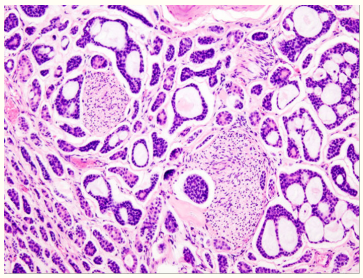
Benign Tumours :

	Pleomorphic adenoma	Warthin's tumor
Features	• Benign, slow growing • A/w PLAG – 1 mutation	• 2nd m/c tumour, mostly bilateral • m > F
Lobe involved	Superficial lobe	Superficial lobe
Investigations	• IOC : FNAC • Imaging : CT/MRI	• IOC : FNAC
Treatment	Superficial parotidectomy	Superficial parotidectomy
HPE findings	Triphasic tumour with epithelial cells in myxoid backgrounds  Epithelial cells	• Two layers of cells (mitochondria rich) • Lymphocytic infiltration  2 layers of cells
Complication	Carcinoma ex pleomorphic adenoma (malignant transformation)	-

----- Active space -----

Malignant Tumours :

1. Mucoepidermoid carcinoma.
2. Adenoid cystic carcinoma :
   - 2nd m/c parotid tumour.
   - PNI ⊕.
     - Extremely painful.
     - ↑ Recurrence rate.
   - HPE : Swiss cheese appearance.



HPE : Adenoid cystic carcinoma

3. Carcinoma ex pleomorphic adenoma/mixed malignant tumor :
   - Malignant transformation of pleomorphic adenoma.
   - Signs of malignant change :
     - Rapid ↑ in size.
     - Painless → painful (D/t capsular stretching).
     - Ulceration.
     - Facial nerve involvement.
     - Lymph node enlargement.
   - IOC : FNAC.
   - Mx : Surgery f/b radiotherapy.

Treatment :

Principles :

- Margin : 0.5 cm.
- Elective SOHND : T3/T4 tumours and high-grade tumours.
- Adjuvant radiotherapy indicated if :
  - Stage 3 and 4.
  - High grade tumours.
  - Positive margins.
  - PNI ⊕/LVI ⊕.
  - ENE ⊕.

Parotidectomy :

Incision : Lazy S incision/modified Blair's incision.

Types :

- Superficial.
- Total (Superficial + deep lobe removed).
  - Conservative (Facial nerve spared).
  - Radical (Facial nerve removed).

    Cable graft (Sural nerve > Greater auricular nerve).

----- Active space -----

Complications :

- Haemorrhage.
- Nerve injury :
  - Facial nerve.
  - Greater auricular nerve : Anaesthesia over beard region.
  - Marginal mandibular branch > Cervical branch of facial nerve : Drooping of angle of mouth.
- Parotid fistula.
- Frey's syndrome :
  - Gustatory sweating.
  - Auriculotemporal nerve involved :

Post ganglionic parasympathetic fibers —Supplies→ Skin glands → Sweating over parotid region.

  - Ix : Starch iodine test.
  - Mx → TOC : Tympanic neurectomy.
    → First line : Botox and anti-perspirants.
  - Prevention : SCM flap/digastric muscle flap to cover parotid bed.

Starch iodine test

SUBMANDIBULAR TUMORS

- M/c tumour : Pleomorphic adenoma.
- M/c malignant tumour : Adenoid cystic carcinoma.

O/E : Bimanual palpation.

  - Submandibular gland : Palpable.
  - Submandibular LN : Not palpable.


Submandibular swelling

Diagnosis : FNAC (IOC).

Mx : Submandibular excision.

Complications of Submandibular excision :

- Haemorrhage.
- Nerve injury :
  - Marginal mandibular nerve (M/c injured).
  - Lingual nerve.
  - Hypoglossal nerve.
- Injury to other structures : Anterior facial vein, facial artery.


Bimanual palpation

----- Active space -----

SUBLINGUAL TUMOUR

m/c tumour of sublingual gland : Adenoid cystic carcinoma.

MINOR SALIVARY GLAND TUMORS

- m/c tumour : Adenoid cystic carcinoma.
- m/c site : Hard palate.

Neck Swellings

00:34:00

Dermoid Cyst :

Formed at lines of embryonic fusion.

Classical site : Post auricular/outer canthus of eye.

O/E : Fluctuant swelling.

Imaging : Done prior Sx, to rule out intracranial extension.

Mx : Surgery.

Dermoid cyst

Tubercular Cervical Lymph Node :

Collar stud/cold abscess.

Mx : Anti-gravity aspiration. (Avoid dependant aspiration to prevent sinus/fistula formation).

Cold abscess

GASTROINTESTINAL SURGERY : PART 1

----- Active space -----

Surgical Anatomy of Esophagus

00:00:50

3 main constrictions

Structures associated	Distance from upper incisor	Relevance
1. Pharyngoesophageal junction (C6)	15cm	• Narrowest portion of GIT • Foreign bodies can get stuck • Iatrogenic perforations
2. Left main bronchus & arch of aorta	25cm	-
3. Esophagus pierces diaphragm	40cm	-

Foreign Body

00:01:30

Features :

Location	Lateral view	Frontal view	Symptoms
Esophagus	Side of coin seen	Face of coin seen	Difficulty swallowing
Trachea	Face of coin seen	Side of coin seen	Stridor & choking

X-ray : FB in trachea

X-ray : FB in esophagus

Note : Button battery → Double ring sign.

Management :

- Beyond C6 : Patient observation.
- Impacted at C6 : Endoscopic removal.

} If coin

- Button battery : Endoscopic removal (D/t corrossive nature → Perforation).

Corrosive Injury

00:03:12

Causes :

1. Alkali : Liquefactive necrosis → Penetrates deeper (more dangerous).
2. Acids : Pylorospasm → Gastric damage.

----- Active space -----

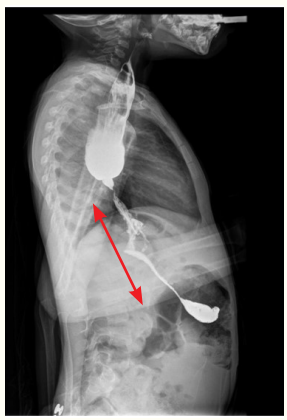
Grading :

Zargar classification.

Endoscopic finding	Grading
Normal	0
Superficial edema/erythema	1
mucosal/Submucosal ulceration	2
Transmural ulceration with necrosis	3
Perforation	4

Management :

- IV fluids & NPO.
- NG tube should not be inserted blindly → Can cause perforation.
- No role of prophylactic antibiotics.
- Most important intervention : Early skilled endoscopy.
- No role of steroids.
- Definitive management : Mx of stricture.

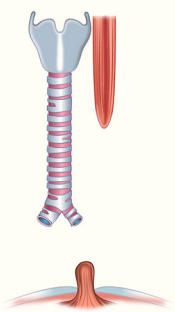


Barium swallow : Stricture

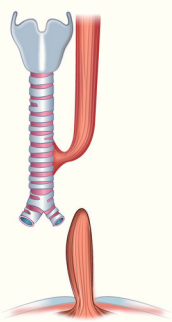
Tracheoesophageal Fistula (TEF)

00:05:39

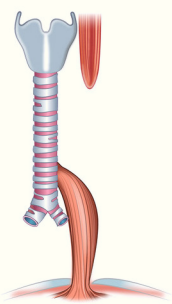
Types :



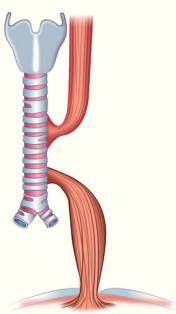
Type A : Isolated EA



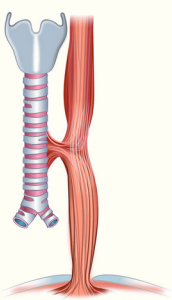
Type B : Proximal TEF with distal EA



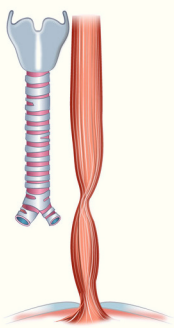
Type C : Proximal EA with distal TEF (m/c)



Type D : Proximal and distal TEF



Type E (or H) : TEF without EA (Patent esophagus)



Type F : Esophageal stenosis

EA : Esophageal atresia.

Clinical Features :

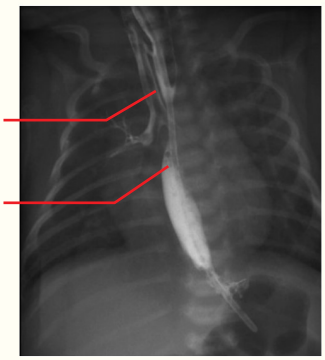
- Respiratory distress.
- Excessive drooling of saliva.
- Coiling of oro-gastric tube.
- Rule out : VACTERAL anomalies.

VACTERAL	
Vertebral	Tracheoesophageal
Anorectal	Renal
Cardiac (m/c)	Limb defects

----- Active space -----

Investigations :

1. Contrast study : Confirmatory Iohexol > Dinosil.
2. Combined tracheoesophagoscopy :
   IOC for H-type.



H-type TEF

Management :

Waterson's criteria :

Birth weight	Pneumonia	Management
≥ 2.5 Kg	⊖	Surgery
1.5–2.5 Kg	⊕/⊖	Nutrition supplementation for weight gain → Sx.
< 1.5Kg		Feeding gastrostomy for nutrition → Delayed Sx.

Surgery :

1. Type A → Two ends are close : Anastamose.
   → Two ends are far : Gastrostomy → Anastamosed when ends are close.
2. Type B, C, D, E : Cameron haight surgery
   Posterolateral thoracotomy → Cut fistula → Repair trachea & esophagus.

GERD

00:09:46

Factors which maintain LES Patency :

1. Length of intra abdominal esophagus (most important) :
   - 3–5 cm : Normal.
   - <2 cm : Predisposition to GERD.
2. Pinching effect of right diaphragmatic crura.
3. Orientation of gastroesophageal Angle of His.
4. Arrangement of mucosal folds (Least important).

Note : Lower esophageal sphincter (LES) pressure <6 mmHg → GERD.

Pre-disposing Factors :

- ↑Transient LES relaxation : Earlient physiological indicator.
- ↑Obesity & ↓H. Pylori infection rate → ↑GERD.

Note : Central obesity → ↑Risk of Barrett's & adenocarcinoma.

Clinical Features :

- Restrosternal burning sensation (Heart burn).
- Water brash.
- Pharyngitis/Laryngitis.
- Chronic cough.
- Wheezing.
- Dental caries.

----- Active space -----

Investigations :

1. Endoscopy : IOC.
2. 24 hr pH monitoring : Gold standard.

Management :

1. Lifestyle changes :
   - Reduce weight.
   - Small frequent meals.
   - Last meal 2 hrs before bed.
2. Medical Mx : PPI & prokinetics.
3. Surgical Mx : Fundoplication.

Fundoplication :

Indications :

1. Not responding to medical Mx.
2. Complications of GERD ⊕.
3. GERD a/w large hiatal hernia.
4. Patient wants to stop medical Mx.

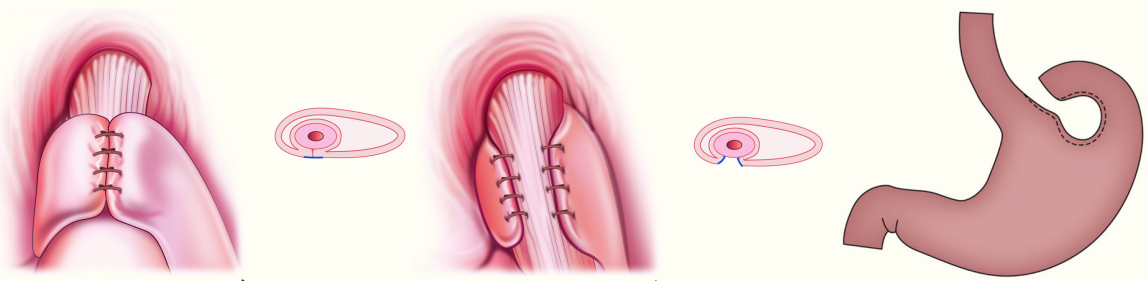
Principles of fundoplication :

- To restore adequate intra-abdominal length.
- To tighten the diaphragmatic crura.
- To wrap fundus around esophagus.
- To preserve vagus nerves.
- To re-establish the angle of His.

Types of fundoplication :

1. Complete wrap (Nissen's 360°) → Gas bloat syndrome (M/C complication).
2. Partial wrap (Prevents gas bloat) :
   - Dor (180° anterior).
   - Toupet (180–270° posterior).
   - Belsey mark (270° anterior).

Note : Collis gastroplasty → Create new esophagus, ↑length by ≥3 cm.



Nissen's Toupet's Collis gastroplasty

Newer Modalities :

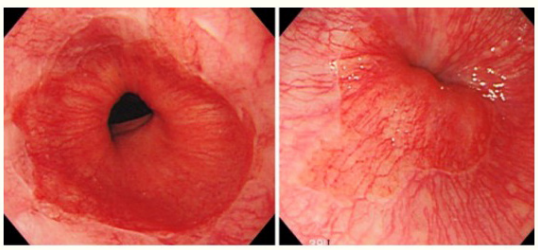
1. Polymer injection : High recurrence.
2. Endoscopic RFA : Good longterm results.
3. Magnetic sphincter augmentation (LINX).
4. Transoral incision less endoscopic fundoplication (TEMPO trial).

Barrett's Esophagus

00:15:20 ----- Active space -----

Features :

1. Complication of long standing GERD.
2. Specialised intestinal metaplasia (Squamous → Columnar epithelium).
3. Red velvety mucosa.

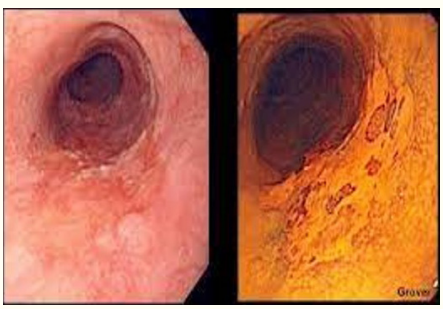


OGD : Red velvety mucosa

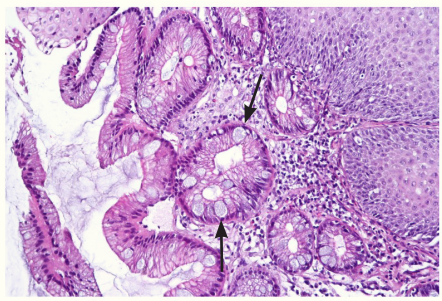
Investigations :

1. Endoscopic biopsy : Diagnosis.
2. HPE : Goblet cells (Pathognomonic).
3. Chromoendoscopy :
   - For microscopic involvement.
   - Methylene blue for Barrett's/Adenoca.
   - Lugol's iodine for SCC.

Note : For goblet cells → use alcian blue.



Chromoendoscopy



HPE : Goblet cells

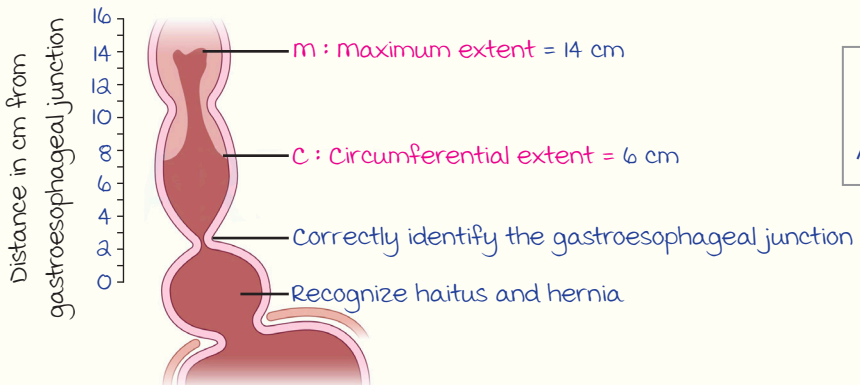
Types :

1. Long segment : >3 cm.
2. Short segment : <3 cm.
3. Cardia metaplasia : Microscopic.

Risk of Malignancy :

High grade dysplasia > Low grade dysplasia > Barrett's esophagus (0.2–0.5%).

Prague C & M Criteria :



↑C & M score
↓
↑Risk of Adenocarcinoma.

----- Active space -----

Seattle Protocol for Biopsy :

1. No dysplasia : Repeat OGD 3–5 yearly (Except with >3 cm : 2–3 yearly).
2. Low grade dysplasia :

   Endoscopic ablation (RFA) of dysplastic mucosa

   ↓

   OGD every 6 months : Till 2 consecutive non dysplastic biopsies.
3. High grade dysplasia/T1a :
   - MDT discussion.
   - ± Esophagectomy/RFA.

Biopsy : 4 quadrant biopsies every 2cm + Targeted biopsies of macroscopic lesions.

Treatment :

1. RFA : Cost effective + ↓S/E.
2. EMR (Endoscopic mucosal resection) :
   - Removes whole mucosa.
   - Higher rate of strictures.

Esophageal Cancer

00:20:55

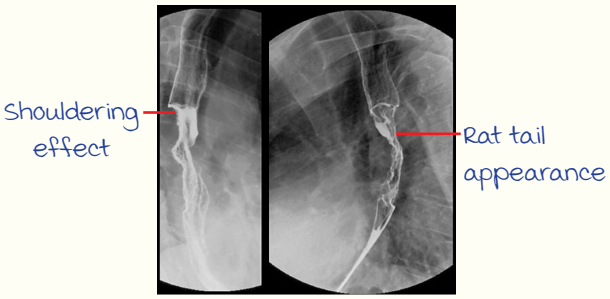
	Squamous cell carcinoma	Adenocarcinoma
	m/c in Asia ; m/c overall	m/c in western world
Location in esophagus	Middle one-third	Lower one-third
Risk factors	• Smoking, alcohol • Preservative rich food • Smoked food • Tylosis • Achalasia cardia • Vit E and selenium deficiency • Zenker's diverticulum • Corrosive injury • Plummer Vinson syndrome	• Smoking, alcohol • GERD • CREST syndrome • Barrett's esophagus

Clinical Features :

- Progressive dysphagia (Solids more than liquids).
- Weight loss.
- Hoarseness : Sign of advanced disease (Left Recurrent laryngeal nerve (RLN) involvement).
- Chronic cough.

Investigations :

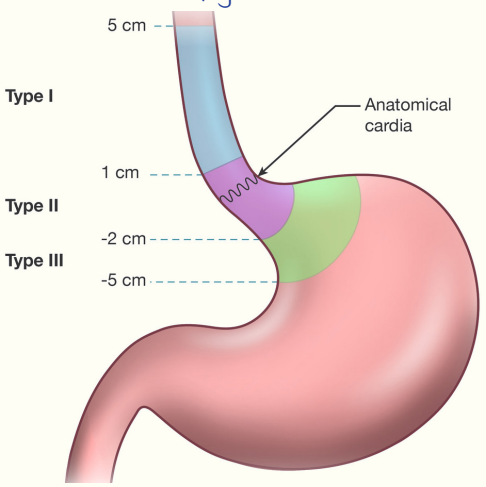
1. Endoscopic biopsy : IOC.
2. PET-CT : IOC for staging (F18-FDG).
3. Endoscopic USG : IOC for T-staging.
4. Barium swallow : Rat tail appearance (Apple core deformity).



Barium swallow

Siewerts classification

Used for GE junction tumours.



Type I & II : Esophageal Ca
Type III : Gastric Ca

----- Active space -----

Treatment :

Esophagectomy :

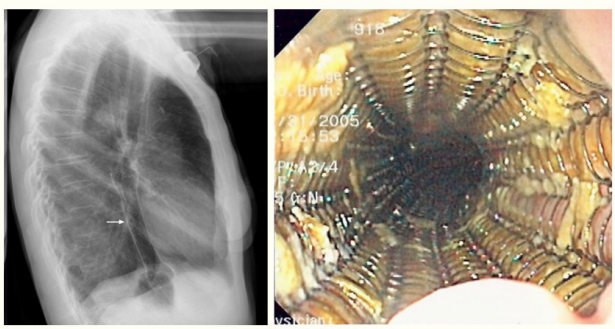
- Margins :
  - Proximal : 10 cm.
  - Distal : 5 cm.
- Minimum lymph nodes removed : 15.

Minimum lymph nodes removed

- Breast : 10
- Colorectal : 12
- Esophagus : 15
- Stomach : 16

Esophageal replacements :

1. Gastric tube (Best) :
   Based on right gastroepiploic artery & right gastric artery.
2. Jejunum/colon : If stomach is affected. (Corrosive injury.)
3. SEMS (Self Expanding Metallic Stents) :
   - Used in malignant TEF.
   - M/c complication : Migration.


SEMS

Note : Main prognostic factor for esophageal Ca. → T-stage (Depth of invasion).

----- Active space -----

Esophageal Leiomyona

00:26:36

- m/c benign tumour of esophagus.
- Site : Mid to distal esophagus.
- m > F.
- Usually asymptomatic (Dysphagia ±).
- Barium swallow : Punched out appearance.

Punched out appearance

Management :

- Enucleation
- STER : Submucosal Tunnelling Endoscopic Resection.

Zenker's Diverticulum

00:27:39

AKA Cricopharyngeal achalasia.

Features :

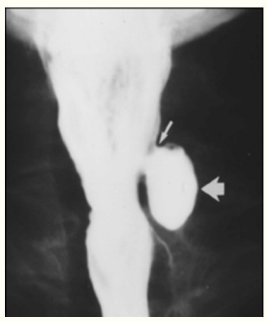
1. Killian's dehisence (Site) : Potential space b/w thyropharyngeus & cricopharyngeus.
2. Pulsion diverticulum : D/t ↑pressure.
3. False diverticulum : Only mucosa comes out.
4. Position : Posterior midline (Starts) ⟶ Left of midline (Final).

Clinical Features :

- Regurgitation (Earliest).
- Halitosis.
- Aspiration pneumonitis (m/c complication).

Investigation :

Barium swallow (IOC).



Management :

1. Diverticulectomy + Cricopharyngeal myotomy. (Best, ↓recurrence rate).
2. If not fit for Sx : Dohlmann's procedure.
   - Endoscopic diverticulopexy + Cricopharyngeal myotomy.
   - Linear stapler/Laser used.
   - ↑Recurrence.

Note : Mid-esophageal/Parabronchial diverticulae.

- True diverticulum.
- Traction diverticulum.
- Cause : TB/Histoplasmosis.
- Large/Symptomatic ⟶ Diverticulectomy.

Hiatal Hernia

00:30:39 ----- Active space -----

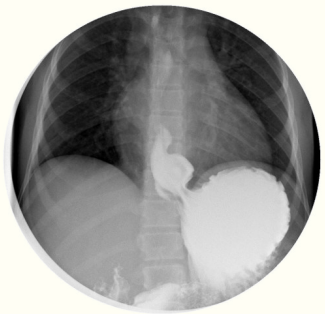
Type I/Sliding Hiatal Hernia :

- m/c diaphragmatic hernia. (m/c congenital diaphragmatic hernia: Bochdalek).
- GE junction : moves proximally

C/f : GERD/Asymptomatic. (Not life threatening)

IOC : CT with oral contrast.

Mx : Surgery only in large/symptomatic hernia

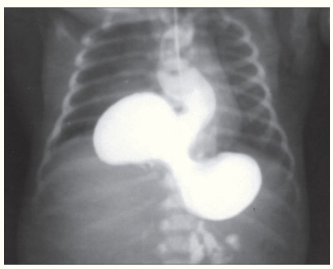


Sliding hiatal hernia

Type II/Rolling/Paraesophageal Hiatal Hernia :

- Portion of stomach herniates into thoracic cavity → Volvulus & necrosis (Life threatning).
- GE junction : (N).

Mx : Surgery.



Rolling hiatal hernia

Type III :

Sliding + Rolling.

Mx : Based on rolling component.

Type IV :

Paraesophageal (Content : Not stomach).

Esophageal Perforation

00:33:02

Iatrogenic Perforation :

Cause : Post endoscopy (Therapeutic, Cancer related etc).

Site : Upper 1/3rd (Narrowest constriction).

C/f : Chest/Abdominal pain post endoscopy.

IOC : CECT

Rx :

- Small perforation + Stable patient + No sepsis : Conservative
  - → NPO.
  - → IV fluids.
  - → IV Antibiotics.
  - → Analgesics.
- Large perforation + Sepsis (+) : Surgical repair.

Spontaneous Perforation/Boerhaave Syndrome :

Cause :

- Forceful vomiting against a closed glottis.
- Seen in alcoholics.

Site : m/c lower 1/3rd (Lt posterolateral wall).

----- Active space -----

Clinical features :

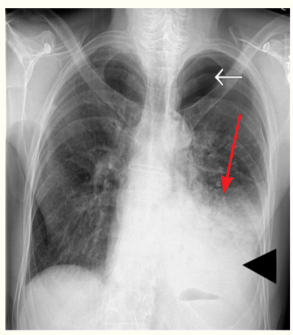
- Mackler's triad : S/c emphysema + Retching + Chest pain.
- Hamman's crunch : Crunching sound on heart auscultation.
- High mortality.

D/D : Mallory weiss tear.

Mallory Weiss tear
• Split in mucosa/submucosa • Upper GI hemorrhage

Investigations :

- Stable patients : CECT.
- Unstable patients : Contrast study.
- X-ray : Pneumomediastinum
  a. Naclerio V sign.
  b. Continuous hemidiaphragm.
  c. Ginkgo leaf sign.
  d. Pleural effusion.



Pleural effusion

Contrast leak

Management :

1. Conservative Mx : Stable pts.
   Objectives → Seal perforation.
   → Adequate drainage.
   → Nutritional support.
2. Endoscopic sealing with clips/SEMS.
3. T-Tube placement & open repair.

Other Benign Esophageal Conditions

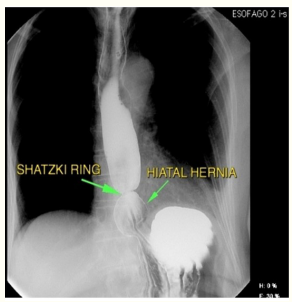
00:37:57

Shatzki Ring :

B ring (mucosal submucosal).

C/f : Intermittent dysphagia.

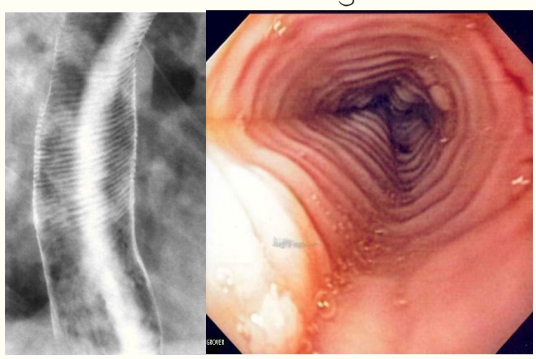
Mx : If symptomatic → Dilatation.



Schatzki ring

Feline Oesophagus :

- Lines markings on imaging.
- Endoscopy : Stacked up appearance.
- Seen in :
  - GERD (m/c), lower 1/3rd.
  - Eosinophilic esophagitis, upper 1/3rd.



Feline oesophagus

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Eosinophilic Esophagitis :

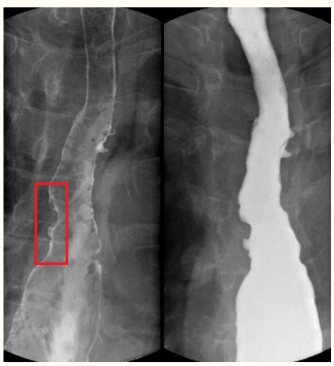
- Chronic immune/antigen mediated disease.
  (D/t food antigens → Cytokines release → Eosinophilia).
- Peak age : 20–30 yrs.
- Endoscopy : Rings, furrows, crepe paper mucosa.
- Biopsy ⊕ : ≥15 eosinophils/hpf.
- Treatment :
  - Steroids
  - PPI

  } Goal : <5 eosinophils/hpf.

Esophageal Infections :

1. Esophageal candidiasis :

- A/w oral thrush.
- Seen in immunocompromised patients.
- Endoscopy : Shaggy appearance.
- Barium swallow : Worm like ulcers.



worm like ulcers

2. CMV :

- Seen in post transplant patients/GVHD.
- Ulcers : Serpigenous/Geographical.

3. Herpes :

- A/w herpes labialis.
- Ulcers : Small with raised margins.

Achalasia Cardia

00:40:50

M/c motility disorder.

Cause :

Failure of LES to relax (D/t loss of ganglion cells in Myenteric & Auerbach plexus).

Types of Achalasia :

- Primary achalasia : Loss of ganglion cells.
- Secondary achalasia : Secondary to Chagas disease (Trypanosoma cruzii).
- Vigorous achalasia : Rapidly progressive.
- Pseudoachalasia : Seen in malignancy.
- Triple A syndrome (Allgrove syndrome) : Alacrimia, Achalasia, ACTH resistant adrenal insufficiency.

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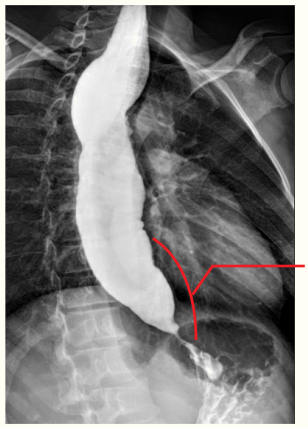
Clinical Features :

- Triad : Dysphagia, regurgitation (Earliest) & weight loss.
- Dysphagia → Initially : Liquids > Solids.
  → Later : Solids > Liquids.
- Heart burn.
- Nocturnal coughing.
- Post prandial choking.

Complication : Aspiration pneumonitis (m/c).



Birds beak appearance (Barium swallow)

Investigations :

1. Barium swallow
2. Endoscopy

} Rule out cancer.

Classification of Achalasia Cardia :

Chicago classification :

IOC : Manometery.

	Type I	Type II	Type III
Features	• Classical • DCI <100 mmHg	• Achalasia with esophageal compression • Pan esophageal pressurisation in >20% Swallows	• Spastic • DCI >450 mmHg
Peristalsis	No normal peristalsis (100% failed)		
Median IRP	Elevated (> 15 mmHg)		

Eckardt score :

- Weight loss.
- Dysphagia.
- Retrosternal pain.
- Regurgitation.

Treatment :

1. Botox :
   - Highest recurrence.
   - Repeated injections : Scarring.
   - Restricted to elderly patients with co-morbidities.

2. Pneumatic dilatation :
   - Similar efficacy as myotomy.
   - Indications : Elderly, female undilated esophagus, type II achalasia.

3. Heller's myotomy :
   - Laparascopic myotomy : 6cm proximal to 2-3 cm distal.
   - Better outcome in type I & II.
   - m/c complication : GERD (Prevention : fundoplication).

4. POEM :
   - Per-oral endoscopic myotomy.
   - Best for type III & other spastic conditions.
   - Submucosal tunnelling → muscles cut → mucosa sutured.
   - ↑Rate of esophagitis.

Distal Esophageal Spasm

00:46:54 ----- Active space -----

Features :

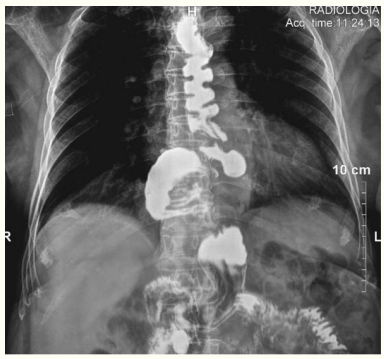
- 5 times less common than achalasia.
- F > M.
- Simultaneous, repetitive, high amplitude contractions.

Clinical features :

- Chest pain (Angina like).
- Dysphagia.

Investigations :

1. ECG.
2. Manometry.
3. Barium study : Corkscrew/Rosary bead appearance.



Rosary bead esophagus

Congenital Hypertrophic Pyloric Stenosis (CHPS)

00:48:51

Features :

- Pyloric hypertrophy → Gastric outlet obstruction.
- Usually affects first born male child.

Clinical Features :

Normal at birth —2-3 weeks→ Projectile, non-bilious vomiting.

On examination :

- Palpable olive shaped epigastric mass
- Visible peristalsis (Left → Right)

} Feeding : Best time to examine.

Differential Diagnosis :

	CHPS	Duodenal atresia
At birth	Normal	Bilious vomiting
Complaints	Non-bilious projectile vomiting after few weeks	Bilious vomiting
Seen m/c in	First born male child	Down syndrome
IOC	USG	X-ray
Mx	Ramstedt pyloromyotomy	Duodenoduodenostomy

Investigations :

1. USG : IOC → Pyloric channel
   - Thickness >4 mm.
   - Length >16 mm.

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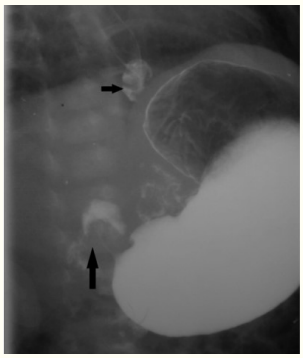
2. Contrast study :
   - Mushroom sign.
   - Double track sign.
3. Labs : Hypochloremic hypokalemic metabolic alkalosis with paradoxical aciduria (m/c metabolic abnormality).


Contrast study

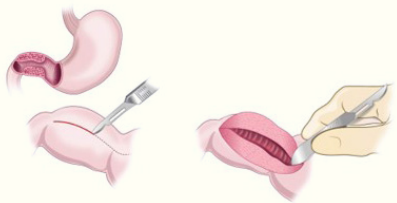
Treatment :

Correction of metabolic abnormality :

- Best fluid = 0.45% NS + Dextrose + KCl (If urine output : Ⓝ).
- RL.

Ramstedt's pyloromyotomy :

- Surgical Mx of CHPS.
- Pylorus cut → Mucosa should bulge out.
- Resume feeding → Uneventful Sx : Within 4–6 hrs.
  → Mucosal injury ⊕ : After 24–48 hrs.


Ramstedt's procedure

Peptic Ulcer Disease

00:52:44

Features :

- m/c type : Duodenal ulcers (90%. a/w H. Pylori & ↑acid production).
- m/c complication : Bleeding.
- m/c cause of upper GI hemorrhage.

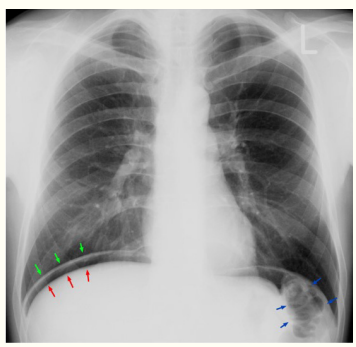
Duodenal Ulcers :

Posterior ulcers :

- m/c complication : Bleeding (D/t erosion of gastroduodenal artery).
- Mx : Endoscopic (2 attempts) —Fails→ Open surgery (Underrunning of vessel).

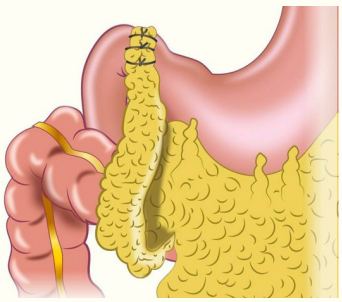
Anterior ulcers :

- m/c complication : Perforation → Perforation peritonitis.
- C/f :
  - Pain.
  - ↑HR, ↓BP.
  - Rebound tenderness.
  - Board like rigidity.
- Investigation : X-Ray → Gas under diaphragm (Hollow viscus perforation).


Air under diaphragm

----- Active space -----

- Treatment :
  - NPO.
  - I.V fluids.
  - Emergency exploratory Laparotomy + Omental patch repair.
  - I.V Antibiotics.
  - Painkillers.



Graham's omental patch repair

Gastric Ulcers :

60% a/w H. Pylori..

Johnson criteria :

Type	Location	Features
Type 1	Along the lesser curvature	Most common type
Type 2	Prepyloric + duodenal	Associated with acid hypersecretion
Type 3	Only prepyloric	
Type 4	Body of stomach	Bleed most commonly : D/t left gastric artery branches

Mx :

- Biopsy must be done to rule out malignancy.
- Antrectomy.
- Pauchet's procedure (Type IV ulcers).

H. Pylori :

- CAG-A & VAC-A genes : Toxins.
- Urease : Helps it survive in acidic environments.
- A/w :
  a. Peptic ulcers.
  b. Type B gastritis.
  c. Gastric cancer.
  d. MALTomas.
- Slightly protective against adenocarcinoma esophagus & Barrett's esophagus.

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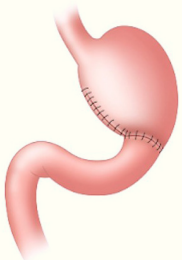
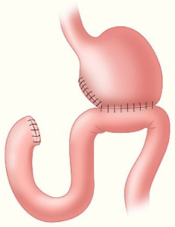
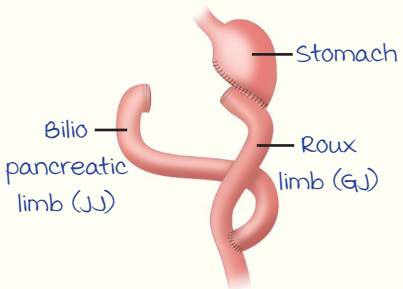
Gastric Reconstruction

00:57:52

	Procedure	Image
Bilroth I	• Gastric resection • Gastroduodenal anastomosis	
Bilroth 2 (Poly a reconstruction)	• Gastric resection • Close duodenal stump • End-to-side gastrojejunal anatomosis	
Roux-en-Y gastro jejunostomy (m/c)	• Gastric resection • Close duodenal stump • End-to-side gastrojejunostomy (GJ) • End-to-side jejunojejunostomy (JJ)	

Vagotomy :

Replaced by PPIs currently.

Truncal vagotomy	Highly selective vagotomy
• Maximal acid reduction • Least ulcer recurrence • Max vagotomy related complication	• Least acid reduction • Max ulcer recurrence

Complications of Vagotomy & Reconstruction :

1. Nutritional deficiencies :
   - m/c : Iron deficiency.
   - Other deficiencies : Vit B12, Vit D3.
2. Internal hernia :

Petersen's hernia	Stemmer hernia
Bowel loop herniates behind roux limb	Bowel loops herniate through the transverse mesocolon
Antecolic reconstruction	Retrocolic reconstruction

3. Dumping Syndrome :

----- Active space -----

Early	Late
Occurs due to rapid influx of fluid in the bowel due to hyperosmolar contents in the bowel	Rebound hypoglycaemia due to excessive insulin release
Epigastric fullness, nausea & vomiting	Hypoglycemia (Tachycardia, sweating, headache)
Worsens with more food	Improves with more food
Starts in 15-20 mins after food	Starts in 30-40 mins after food

Prevention :

- Small frequent meals.
- Avoid liquid with meals.
- Avoid sugar rich liquids
- Avoid simple sugars.
- Take high protein/fat diet.
- Resistant cases : Try octreotide.

Gastric Cancer

01:05:53

Risk Factors :

1. Smoking.
2. Alcohol
3. Smoked fish/food.
4. Preservative rich food.
5. H. Pylori.
6. Gastric resection.
7. Polyps.

Lauren's Classification :

Intestinal	Diffuse
Environmental	Familial
Gastric atrophy, intestinal metaplasia	Blood type A
m > F	F > m
↑Incidence with ↑age	Younger age
Gland formation	• Poorly differentiated • Signet ring cells
APC gene mutations	Mutated E-Cadherin gene (↓E-cadherin)

Other Classifications :

1. Japanese classification :
   - For early gastric cancers : Above muscle layer.
   - Type I : Best prognosis.
2. Borrmann's classification :
   - For advanced gastric Ca : Invading the muscle layer.
   - Type IV (Linitis plastica) : Worst prognosis.

----- Active space -----

Atypical Presentations of Gastric/GI cancers:

Presentation	Description
Troisier sign/Virchow LN	Left supraclavicular lymph node (LN) (Sign of advanced Ca in any GI malignancy)
Irish nodule	Left axillary lymphadenopathy
Blumer's shelf	Mets into pelvis/pouch of Douglas. (Sign of advanced ca in any GI malignancy)
Sister mary joseph nodule	• Periumbilical mets. • m/c : Gastric > Ovarian Ca
Krukenberg tumor	• B/L ovarian mets. • Seen in gastric or lobular breast ca. • Diffuse gastric ca : Signet ring cell (HPE). • Spread : Retrograde lymphatic spread
Leser-Trelat sign	Multiple seborrheic keratosis (Internal malignancy)
Tripe palms	Hyperkeratotic palms (Internal malignancy)

Sister mary Joseph's nodules

Sign of leser trelat

Tripe palms

Investigations :

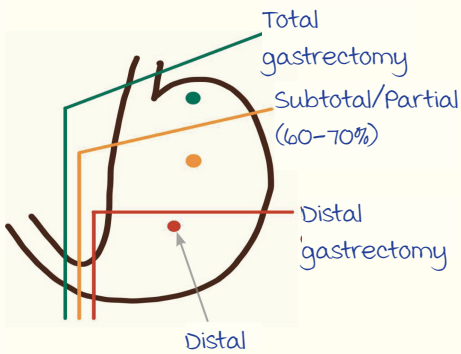
1. Endoscopic biopsy : IOC.
2. PET-CT : IOC for overall staging.
3. EUS : IOC for T-staging (main prognostic factor).

Surgical Management :

1. Primary tumour :
   - Margins : Proximal margin → 5 cm, Distal margin → Pylorus.
   - Resection : Distal/Subtotal (Antral tumor)/ Total.
2. Lymph nodes :
   - D_1 gastrectomy : 1-6 stations removed.
   - D_2 gastrectomy (Optimal) : 1 - 11 Stations removed.

   Minimum no. of lymph nodes removed : 16.

Note : m/c site of mets → Liver.



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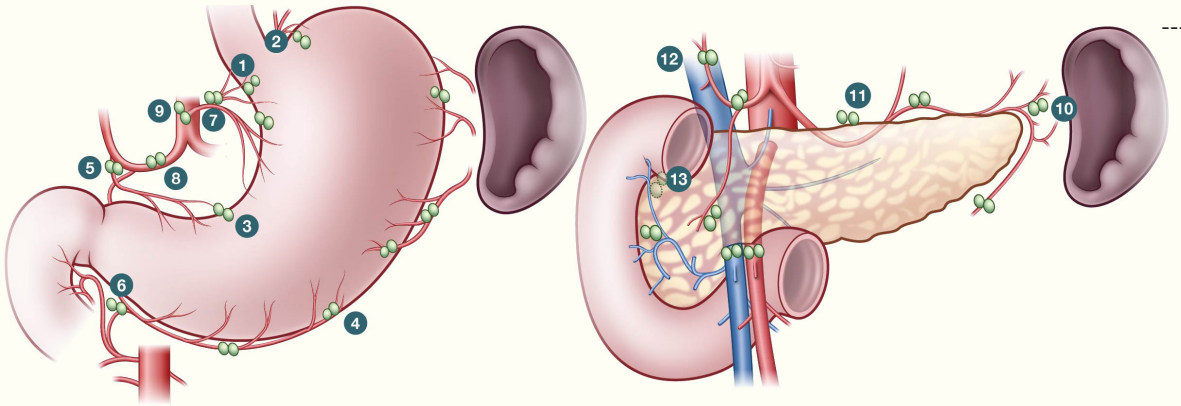


1 Right para-cardial	2 Left para-cardial	3 Lesser curvature
4 Greater curvature	5 Suprapyloric	6 Infrapyloric
7 Left gastric	8 Common hepatic	9 Celiac
10 Splenic hilum	11 Splenic artery	12 Hepatoduodenal ligament
	13 Retropancreatic	

Gastrointestinal Stromal Tumours

01:12:02

Features :

- Origin : Intestinal pacemaker cells of Kajal.
- m/c site : Stomach.
- Sporadic > Familial.

Carney's triad :

1. Gastric GIST : A/w SDH-B mutation (1° imatinib resistance).
2. Pulmonary chondromas.
3. Paragangliomas.

Carney stratakis syndrome :

1. Gastric GIST.
2. Paraganglioma.

Management :

IOC : CECT (Radiological diagnosis).

Treatment :

1. Surgical resection : 2cm margin.
2. Malignant/Metastasis (m/c liver) : Sx + Imatinib.
3. Imatinib resistant : Sunitinib/Sorafenib.

IHC markers :

- CD117/CKIT (m/c).
- CD34 (60-65%).
- DOG 1 : Most specific.
- Wild type : CD117 ⊖ & PDGFα ⊖.

Clinical features :

- Upper GI hemorrhage (m/c)
- Lump
- Perforation

----- Active space -----

Note : Fletcher's classification.

- Differentiate b/w benign & malignant GIST.
- Based on size & mitotic figures.

Gastric Lymphoma

01:14:17

- m/c extranodal site for lymphoma : Stomach.
- m/c type : Diffuse large B-cell lymphoma.

C/f : Lump, upper GI bleed.

Mx : Chemotherapy (RCHOP) → Radiotherapy.

MALToma :

- A/w H. Pylori.
- Low grade : Responds to H. pylori eradication.
- High grade : Treat like lymphoma.

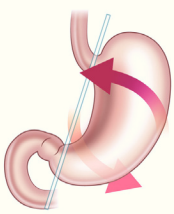
Gastric Volvulus

01:15:13

Twisting of stomach → Borchardt's triad :

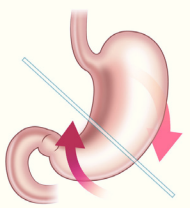
- Unproductive retching.
- Inability to pass ryle's tube.
- Epigastric pain.

Types :



Organoaxial

Organoaxial	mesenteroaxial
• m/c type • A/w diaphragmatic defect • Vascular compromise ⊕	• Chronic symptoms • Diaphragmatic defects : Less common.



mesenteroaxial

Management :

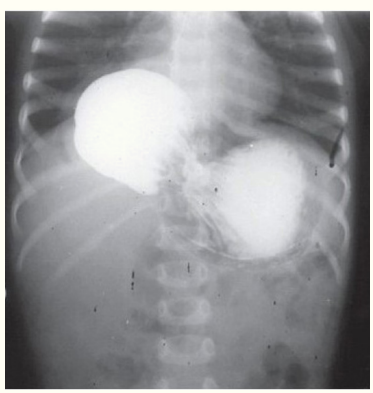
IOC : CECT.

Sx :

- Derotate stomach.
- Fix underlying cause.

Note : Trichobezoar.

- Hairball in the stomach.
- 2° to trichophagy (Eating one's own hair).
- Mx : Surgical removal → Psychiatry reference.



Gastric volvulus

GASTROINTESTINAL SURGERY : PART 2

----- Active space -----

Bariatric Surgery

00:00:50

Indications :

1. BMI >40 Kg/m^2.
2. BMI >35 Kg/m^2 with obesity complications.
3. Asian population : Lower cutoff for Sx.

OS-MRS (Obesity Surgery - Mortality Risk Score) :

The risk factors :

a. Arterial hypertension.
b. Age >45.
c. Male gender.
d. BMI >50Kg/m^2.
e. Risk for pulmonary thromboembolism.

Diabetes mellitus is not part of the criteria.

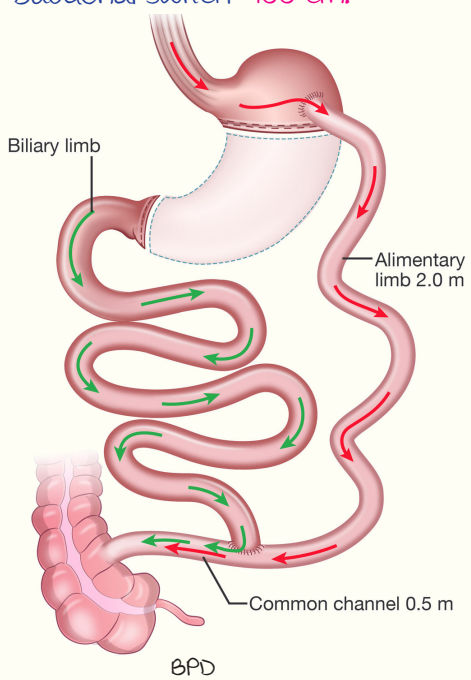
Types :

	Bariatric surgery
m/c	Sleeve gastrectomy
most acceptable	Roux-en-Y gastrojejunostomy
maximum weight loss	Duodenal switch/ Biliopancreatic diversion.
Reversible Sx	Gastric banding & intragastric balloon placement.

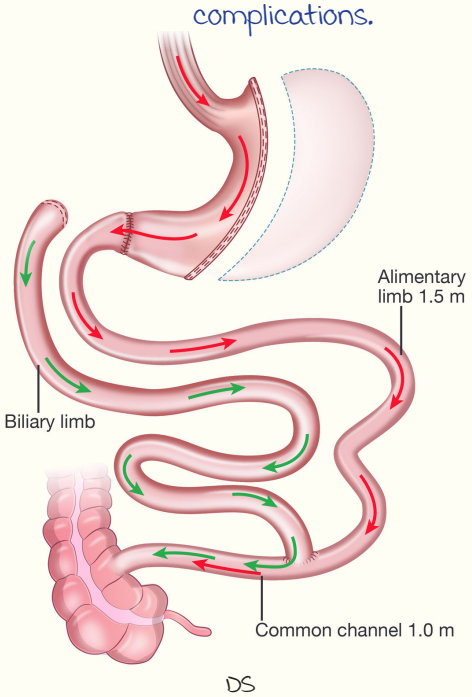
Irreversible Procedures :

1. Biliopancreatic diversion (BPD) & Duodenal switch (DS) :

- Common channel :
  - Biliopancreatic switch : 50 cm.
  - Duodenal switch : 100 cm.
- Maximum weight loss (D/t malabsorption).
- Disadvantage : Maximum surgical complications.



BPD

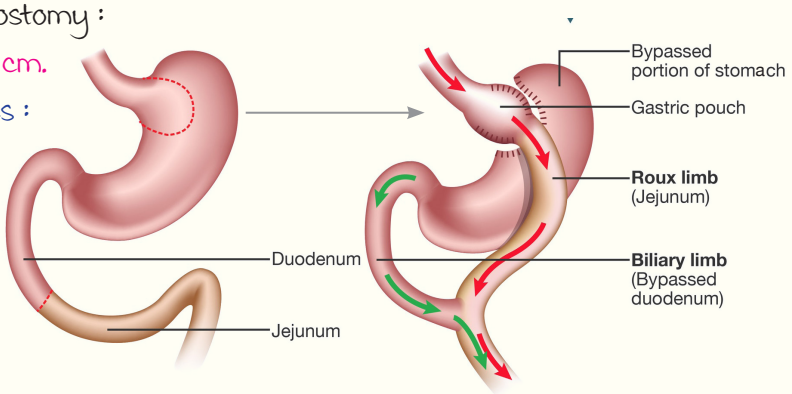


DS

----- Active space -----

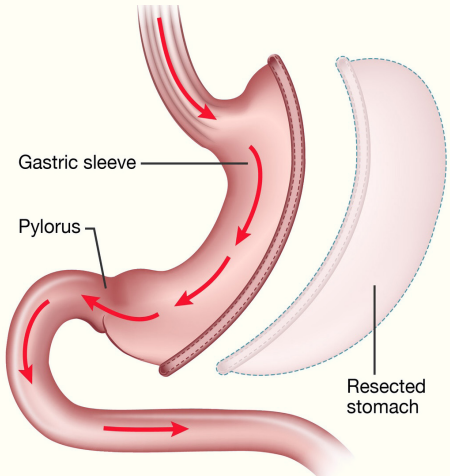
2. Roux-en-Y gastrojejunostomy :

- Roux limb length : 100 cm.
- Nutritional deficiencies :
  - Iron (m/c).
  - Vit D_3/Ca^{2+}
  - Vit B_{12}

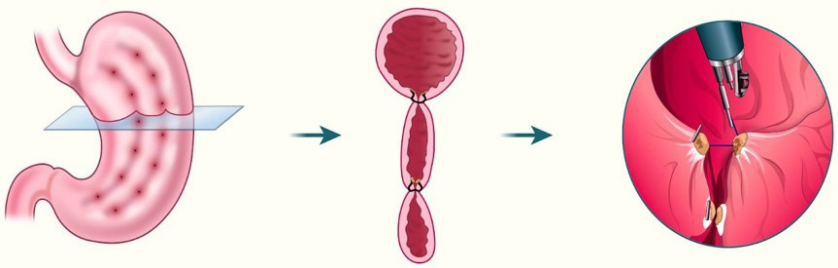


3. Lap. Sleeve gastrectomy :

- m/c done procedure.
- Restrictive surgery :
  Greater curvature of stomach is removed.
- Complications :
  i. m/c : Bleeding from staple line.
  ii. Nutritional deficiencies.
  iii. Leak from angle of His.
  (most distressing → Peritonitis).
  iv. Redistension of sleeve (Mx : TOGA).



Sleeve gastrectomy

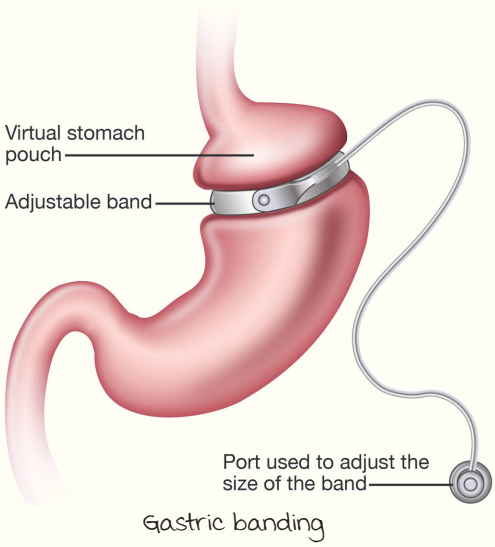


TOGA (Transoral gastroplasty)

Reversible Procedures :

1. Gastric banding :

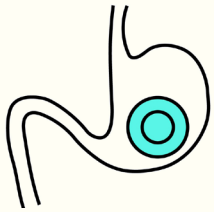
- Band placed 6cm from the GE junction.
- Reversible pressure adjustable balloon
  ↓
  Weight loss can be titrated.
- Complications :
  i. Prolapse (m/c)
  ii. Nutritional complications.
  iii. Erodes into stomach.
  iv. Rupture.



Gastric banding

2. Intragastric balloon placement :

- Balloon is distended in the stomach.
- Removed after weight loss is achieved.
- Self dissolvable balloon : Dissolves after 3 months.



----- Active space -----

Features Of Bariatric Sx :

- m/c cause of death : DVT → Pulmonary embolism.
- AKA metabolic surgery : Weight loss + Improvement in DM/HTN/hyperlipidemia.
- Nutrient replacement :
  - Iron
  - Vit B_{12}
  - Vit D_3 & Ca^{2+}
  - Fat soluble vitamins : In sleeve gastrectomy & Roux-en-Y bypass.

Mesenteric Cyst

00:09:35

IOC : CECT.

Tillaux Triad :

1. Periumbilical swelling.
2. Tillaux sign : Swelling moves at right angle to attachment of mesentery.
3. Transverse band of resonance.

Types :

	Chylolymphatic cyst (m/c)	Enterogenous
Tissue	Sequestered lymphatic tissue	Sequestered bowel tissue
Cyst wall	Thin	Thick
Fluid	Clear	Turbid
Blood supply	Independent	Shared with bowel
Rx	Enucleation	Resection & anastomosis

Upper GI Hemorrhage

00:11:01

Bleeding proximal to ligament of Treitz.

Causes :

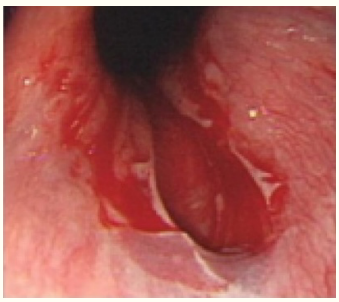
1. Non-variceal bleeding (m/c) :
   - Peptic ulcer (m/c) : Duodenal > Gastric.
   - Mallory Weiss tear.
   - Gastritis.
2. Variceal bleeding.

----- Active space -----

Gastritis types :

Gastritis	Features
Type A	• Autoimmune gastritis (Auto-ab against parietal cells). • Antral sparing, pernicious anemia, achlorhydria.
Type B	H. pylori induced (Affects antrum).
Stress induced	• Cushing's ulcer : In head injury, involves the stomach. • Curling ulcer : In burns, involves first part of duodenum.
NSAIDS	Due to chronic use.
AIDS	D/t cryptosporidium.

Mallory Weiss Tear :



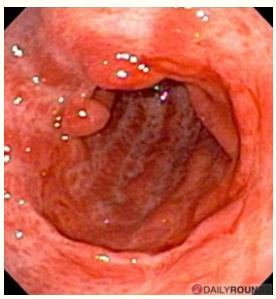
Mallory weiss tear

- Longitudinal tear in mucosa/submucosa (GE junction → Cardia).
- m/c in alcoholics : After a bout of forced vomiting.
- Vessel : Left gastric artery.

Rx : Self limiting.

D/D : Boerhaave syndrome

GAVE (Gastric Antral Vascular Ectasia) :



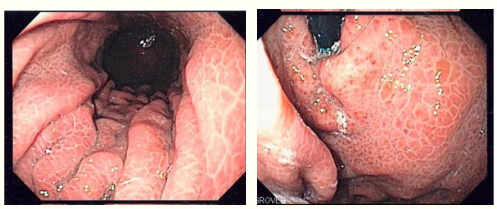
Watermelon stomach

- Seen at antrum.
- Autoimmune.

Endoscopy : Watermelon stomach.
(D/t dilated venules)

Mx : Argon photocoagulation.

Portal Gastropathy :



Strawberry stomach

Seen in portal hypertension.

Endoscopy : Strawberry stomach
(Reddish nodules)

Menetrier's Disease :

Hypertrophied folds

- Hypertrophy of gastric mucosal folds d/t overexpression of TGF α.
- ↑Risk of cancer.

C/f :

- Protein losing enteropathy (Earliest).
- Upper GI hemorrhage.

Mx :

Cetuximab (Monoclonal ab against EGFR) —Fails→ Gastrectomy (Severe cases).

----- Active space -----

Portal Hypertension :

- Variceal cause of upper GI bleeding.
- Doppler (Diagnosis) : Hepatic Venous Pressure Gradient (HVPG).

Measurement	Significance
1-5 mm Hg	Normal
6-10 mmHg	Preclinical sinusoidal portal HTN
≥10 mm Hg	Clinically significant portal HTN → Variceal formation
≥12 mm Hg	↑Risk for rupture of varices

Porto-systemic shunts:

1. Left gastric + short gastric veins → Distal esophgeal veins.
2. Left gastric/gastroepiploeic vein → Esophageal/paraesophageal veins.
3. Caput medusae : Periumbilical.
4. Rectum.
5. Bare area of liver (Segment 7).

Caput medusae

C/f :

- Upper GI bleeding.
- Splenomegaly.
- Ascites.
- Signs of liver failure.

Management :

Bleeding
↓
ABC management
↓
IV drugs :
- Best : IV terlipressin
- m/c used : IV octreotide
- Not used : IV propranalol

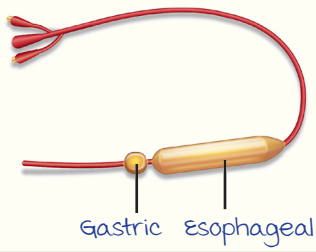
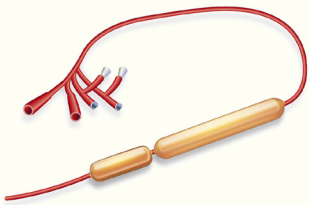
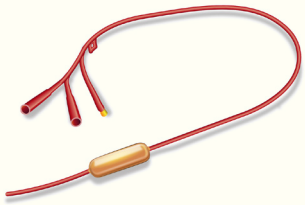
↓ Patient stabilised
Upper GI endoscopy :
Banding (m/c) > Sclerotherapy (Sodium tetradecyl sulphate)
↓ Assess bleeding

Controlled	Uncontrolled
↓	↓
24hr observation	2nd attempt at UGI-scopy
↓ Normal	↓ Fail
Discharge on oral propranolol	Sengstaken blakemore tube
	↓
	Prepare for TIPSS

Note :
1. Airway Mx : To prevent aspiration.
2. IV Pantoprazole : Given after endoscopy.

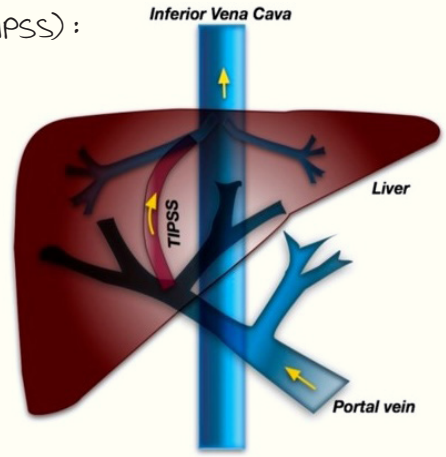
----- Active space -----

For temporary control of bleeding (until patient is ready for TIPSS) :

Sengstaken Blakemore tube	Minnesota tube	Linton tube
3 channels, 2 balloons	4 channels, 2 balloons	3 channels, 1 balloon
		

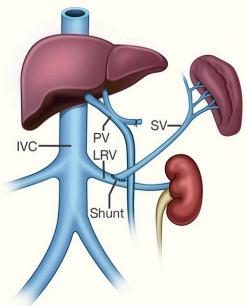
Transjugular Intra-hepatic Portosystemic Shunt (TIPSS) :

- Shunt b/w portal vein & hepatic vein.
- Non-selective
  (Splenic & bowel blood are both shunted).
- Complications :
  a. Rupture of capsule : Earliest.
  b. Blocked → Rebleeding : M/C.
  c. Encephalopathy : D/t nonselective shunt.

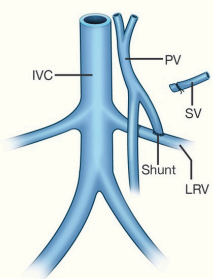


Other shunts :

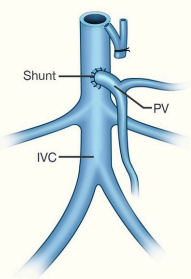
Selective	Non selective
• Warren : Distal splenorenal shunt. • Inokuchi : Left gastric venocaval shunt.	• Linton : Proximal splenorenal shunt. • Eck fistula : Portocaval shunt.
Advantage : • Shunts only splenic blood. • Avoids encephalopathy.	Risk of encephalopathy



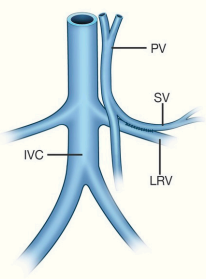
1 Distal Lienorenal (Warren shunt)



2 Proximal Lienorenal shunt with splenectomy (Linton Shunt)



3 End-to-side Portocaval Shunt (ECK Fistula)



4 Side-to-side Lienorenal shunt without splenectomy (Mitra Shunt)

Scoring systems :

1. Rockall's score.
2. BLEED criteria.

} Prognostic scores

3. Child Pugh Turcotte score.

4. Forrest's classification :
   - For peptic ulcer bleeding.
   - Endoscopic assessment.

Forrest's classification :

----- Active space -----

Classification	Description
Acute hemorrhage (High risk)	
Class Ia	Spurting hemorrhage
Class Ib	Oozing hemorrhage
Signs of recent hemorrhage	
Class IIa (High risk)	Non bleeding visible vessel
Class IIb (Intermediate risk)	Adherent clot
Class IIc (Low risk)	Flat pigmented spot
Lesions without acute bleeding	
Class III (Low risk)	Clean ulcer base

Bowel Obstruction

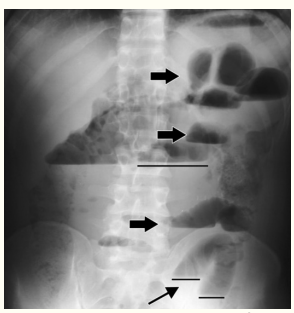
00:24:52

Cardinal Features :

- Non passage of flatus & faeces (Obstipation).
- Vomiting.
- Distention
- Abdominal pain.

Investigations :

1. X-ray abdomen erect & supine : Initial Ix.
2. CECT : IOC in adults.
3. USG : IOC in children.



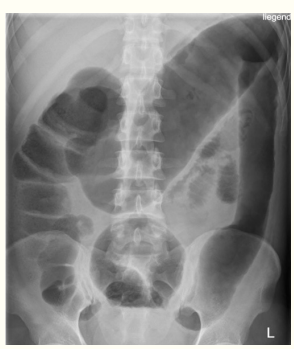
Air fluid levels (>3)

X-ray Features :

1. Erect x- ray : >3 air fluid levels.
2. Supine x-ray :

Site of obstruction	Features
Jejunum	• Feathery appearance. • Valvulae conniventes (Concertina effect).
Ileum	Featureless (Loops of wangensteen).
Large bowel	Incomplete haustrations.

Concertina effect



Incomplete haustrautions

Management of Bowel Obstrution :

1. NPO
2. IV fluids
3. IV antibiotics & painkillers.
4. Ryle's tube insertion.
5. Sx : Emergency laparotomy.

Surgery :

Caecum is visualised Ist → Distended : Large bowel obstruction.
→ Collapsed : Small bowel obstruction.

----- Active space -----

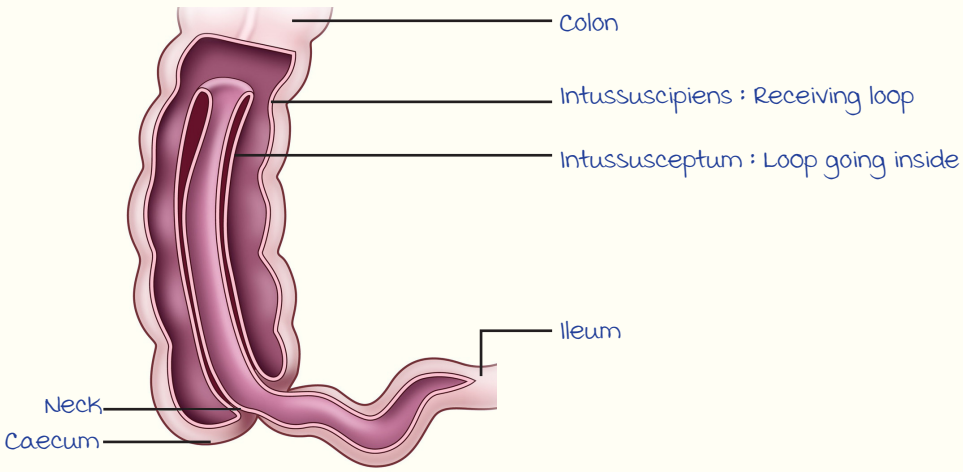
Intussusception :

Telescoping of one bowel loop into another.

(Intussuscipiens : Receiving loop, Intussusceptum : Loop going inside).

Types :

	Primary	Secondary
Age group	6 months – 2yrs	Adults
Trigger	Hypertrophy of peyer's patches	2° to pathological lead point : • Polyp (m/c). • Diverticulum. • Cancer.
Features	• Ileocolic (m/c). • Red currant jelly stools. • Sign of dance : Empty RIF (Lump is in lumbar region).	–

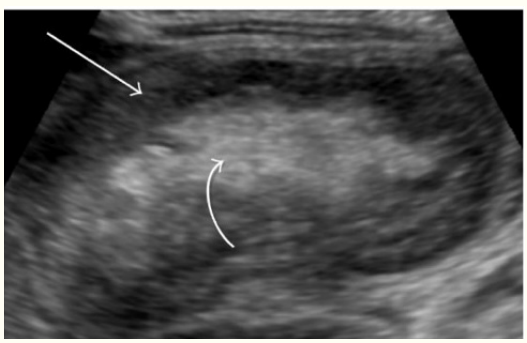


Investigations :

1. X-ray abdomen : Erect & supine (Initial).
2. USG : Target/Donut/Pseudokidney sign.
3. Contrast enema : Pincer/claw sign.
   - Diagnostic & therapeutic.
   - C/I : Perforation, recurrence or 2° to pathological lead point.

Note : IOC.
- In children : USG.
- In adults : CECT.


Target/donut sign


Pseudokidney sign


Pincer claw sign

Sigmoid Volvulus :

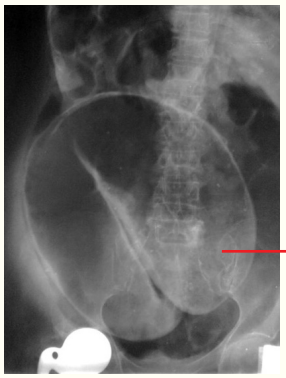
Pre-disposing factors :

- Long & narrow mesentery.
- Redundant sigmoid.
- Loaded sigmoid.

Commonly seen in patients :

- On antipsychotic meds.
- With constipation.

Rotation : Anticlockwise > Clockwise.



Erect X-Ray abdomen

D/D coffee bean sign :

	Sigmoid volvulus	Caecal volvulus
Apex	Points towards Rt Shoulder.	Towards Lt shoulder.
Large bowel	Dilated.	Collapsed. Note : Small bowel dilated.


Contrast Enema :
Bird's beak appearance

Management :

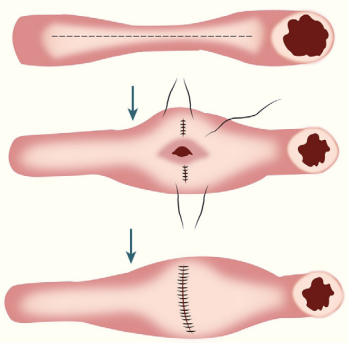
Stable, no peritonitis :
Sigmoidoscopic decompression
(Flatus tube)
↓
Definitive surgery :
Sigmoidectomy.

Unstable, peritonitis
↓
Hartmann's procedure :
1. Resect perforated segment.
2. Proximal colostomy.
3. Distal end closed and kept inside.

Intestinal Structure :

Causes :

1. Cancer.
2. Post radiotherapy.
3. TB.
4. Crohn's disease.


Heinke's stricturoplasty

Mx :

1. Strictures are close : Resection & anastomosis.
2. Strictures are far apart : Heinke Mikulicz stricturoplasty.

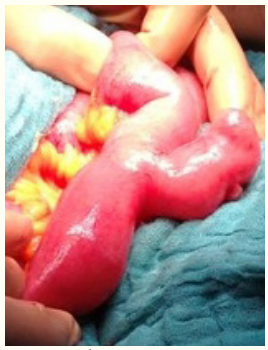
----- Active space -----

Meckel's Diverticulum :

- Remnant of vitellointestinal duct.
- Present along the antimesenteric border.
- True diverticulum : All layers ⊕
- Independant blood supply : Safe resection possible.

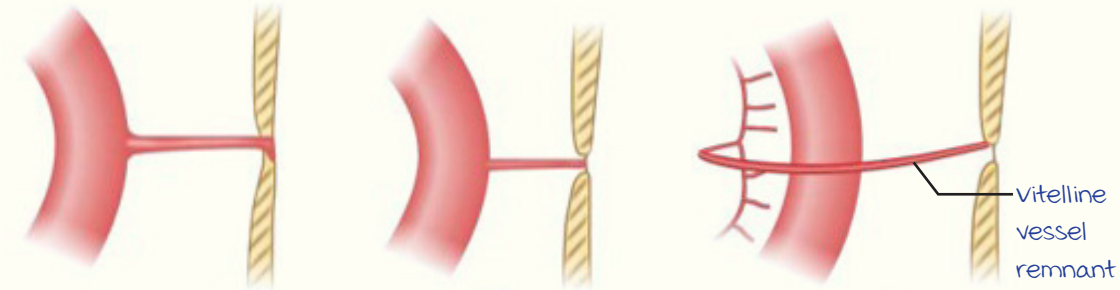
Rule of 2 :

- 2% of population, 2 inches long, 2 feet from ileocolic junction.



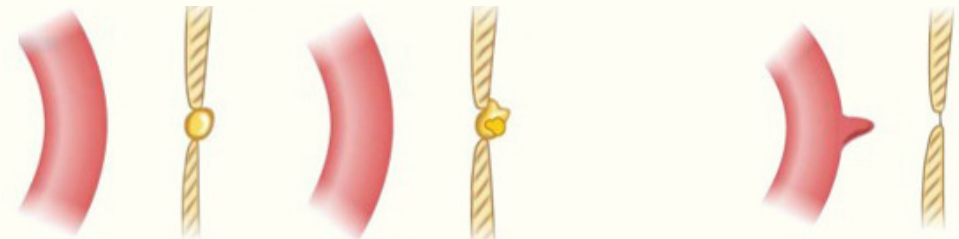
meckel's diverticulum

Vitellointestinal Duct Abnormalities :



1. Completely patent : Fecal discharge

2. Fibrous band formation : Leads to volvulus



3. Patent umbilical end :

Umbilical cyst/polyp → Purulent discharge ±

4. Ileal end patent :

Meckel's diverticulum.

Duodenal Atresia :

Common in Down's syndrome.

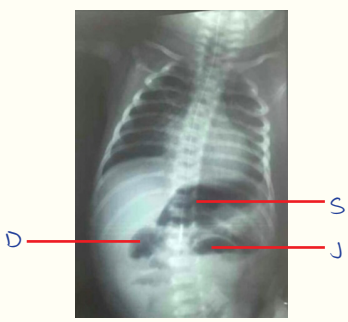
C/f : Billious vomiting since birth.

D/D : CHPS.

X-ray : Double bubble sign.

Mx : Duodenoduodenostomy.

Double bubble sign



Triple bubble sign

Jejunal Atresia :

X-Ray : Triple bubble sign.

(S : Stomach, D : Duodenum, J : Jejunum)

----- Active space -----

Adhesive Intestinal Obstruction :

m/c cause of small bowel obstruction (Dynamic).

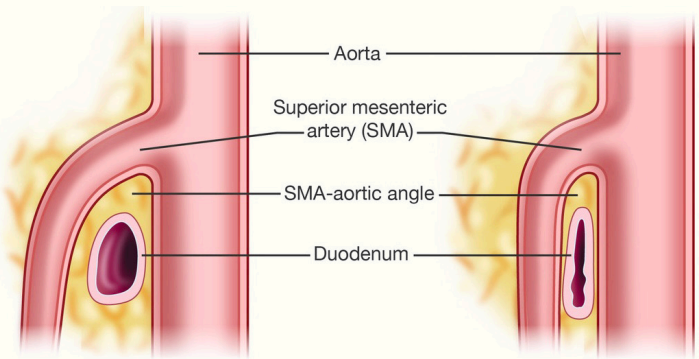
Causes :

1. Post surgery (m/c).
2. Non-surgical causes :
   - Crohn's disease.
   - PID
   - TB
   - Endometriosis
   - Cancer

IOC : CECT.

Mx : Conservative for 48–72 hours $\xrightarrow{\text{Fails}}$ Surgery (Adhesiolysis).

Superior Mesenteric Artery Syndrome :



- Normal angle b/w aorta & SMA : 25–45°.
- Angle <22° compresses D3 (Content).

Causes : Rapid weight loss, spinal cast.

C/f : Bilious vomiting after meals.

IOC : CT Angiography.

Rx :

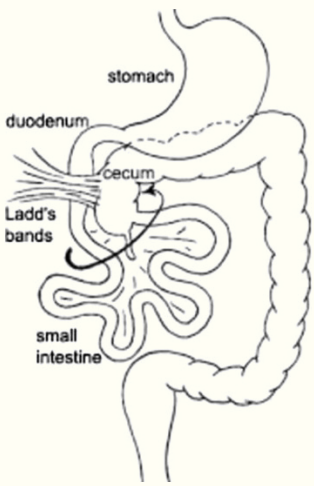
a. Encourage weight gain.

b. Strong's procedure :

Duodenal derotation (Cut ligament of Trietz).

c. Duodeno-jejunostomy.

Ladd's Band :



- m/c intestinal malrotation abnormality.
- Runs from Rt hypochondrium to caecum

  ↓

  Duodenal compression.

Mx : Excision of band.

Hirschsprung's Disease & Paralytic Ileus 00:42:09

Hirschsprung's Disease :

AKA congenital megacolon.

Etiopathogenesis :

- Absence of ganglion cells in auerbach & myentric plexus.

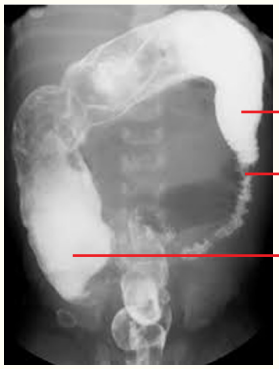
  ↓

  Adynamic/functional obstruction.
- Common in Down's syndrome & MEN 2A/2B.
- Mutation in GDNF (Glial derived neurotropic factor).

----- Active space -----

Clinical Features :

- Non-passage of meconium (m/c).
- Distention.
- Constipation.



Barium enema

Investigations :

1. Full thickness rectal biopsy : IOC.
   - Loss of ganglion cells.
   - Hypertrophied nerve trunks.
   - IHC : Acetylcholinesterase ⊕
2. Barium enema :

Dilated normal proximal bowel → Transition zone → Constricted distal part. (Lack ganglion cells)

Management :

Bypass/resection of abnormal portion → Intraoperative frozen section.

Paralytic Ileus :

- Stunned bowel → Functional block.
- Causes :
  a. Surgical
  b. Hypokalemia (m/c cause of prolonged ileus)
  c. Hypothermia
  d. Uremia
- Last to recover : Rectum.

Mesenteric Ischemia

00:45:14

	Acute mesentric artery embolism (m/c cause)	Acute mesentric artery thrombosis
Etiology	Source of embolism : Heart. Risk factors : IHD, A-fib.	2° to atherosclerosis
Clinical features	• Irregulary irregular pulse. • Bowel attacks : Sudden abdominal pain ↓ Ends with peritonitis.	Bowel angina : • Post prandial abdominal pain (Starts 15-20 min after food). • Food avoidance & weight loss.
mx	IOC : CT Angiography	
	• Early presentation (6-8 hours) : Embolectomy. • Late presentation (Gangrene ⊕) : Resection & anastamosis.	Bypass grafting

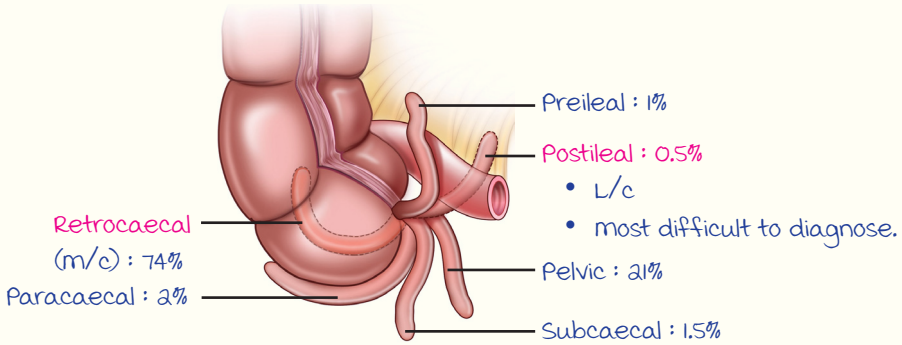
X-ray findings :

Appendictis

00:47:34 ----- Active space -----

Surgical Anatomy :

- Appendicular artery : Branch of lower division of ileocolic artery.
- Appendicular base : Junction of 3 taenia coli.

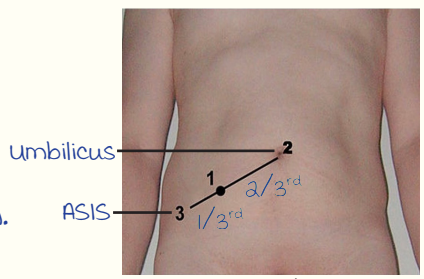


Symptoms :

1. Pain abdomen.
2. Nausea & vomiting (m/c)
3. Anorexia
4. Fever

Signs :

1. McBurney's point tenderness.
2. Rovsing sign : Pain in RIF on pressing LIF.
3. Psoas sign : Pain in RIF on flexion against resistance.
4. Obturator sign : Flexion + internal rotation of hip → Pain.
5. Dunphy's sign : Pain on coughing.



McBurney's point

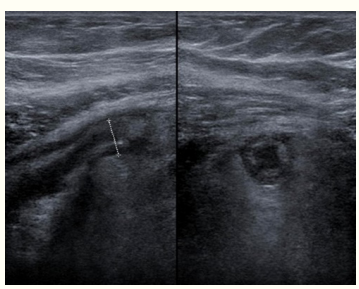
Modified Alvarado (MANTRELS) Score :

Finding	Score
Migration of pain to right lower quadrant	1
Anorexia	1
Nausea & vomiting	1
Tenderness in right lower quadrant	2
Rebound pain	1
Elevated temperature	1
Leukocytosis	2
Left shift of WBC	1
Possible total	10

Score >7 : Likely appendicitis

Investigations :

1. CECT : IOC in adults.
2. USG : IOC in children.
   - Blind ending tubular structure.
   - Probe tenderness.
   - Periappendiceal fluid collection.


USG

----- Active space -----

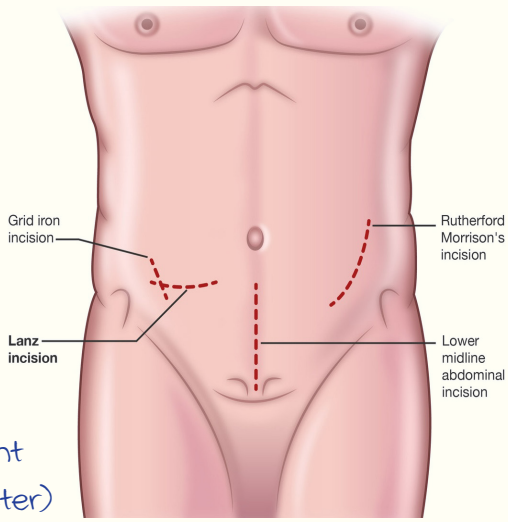
Mangement (Appendicectomy) :

- Inflamed base → Do not crush the base.
  → Bury with purse string suture.
- Gangrenous base : Right hemicolectomy.
- Appendix not inflamed : Rule out meckel's diverticulum (Distal 2 feet of ileum).

Appendicectomy 00:52:38

Incisions Used :

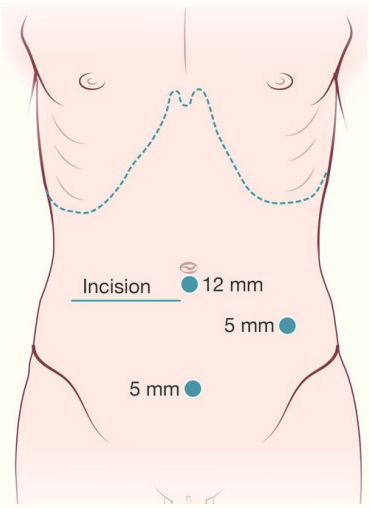
1. McBurney's incision :
   - Grid iron : Muscle splitting.
   - Rutherford morrison : Muscle cutting.
2. Lanz/skin crease/bikini incision :
   Better cosmesis.
3. Lower midline abdominal incision :
   For perforated appendix.



Note : Gibson's incision → Renal trasplant
(Above inguinal ligament) (To identify ureter)

Structures Passed :

1. Skin
2. Superficial fascia.
3. External oblique aponeurosis.
4. Muscles
5. Peritoneum



Lap. appendicectomy

Complications :

1. Wound infection (m/c).
2. Bleeding.
3. Portal pyemia.
4. Stump appendicitis (If stump >4mm).

Other Conditions Of Appendix 00:55:09

Appendicular Perforation :

- Omentum dysfunction.
- Seen in :
  - Children
  - Elderly
  - Adhesions
  - Pregnant females.
  - Immunocompromised patients.

Appendicitis in Pregancy :

- m/c non obstetrical emergency.
- ↑ Risk of preterm labor/abortions.

C/f : Pain in RIF (Can be higher up also).

Ix : USG $\xrightarrow{\text{if uncomfirmed}}$ MRI.

Mx : Lap. appendicectomy in all trimesters.

Appendicular Lump :

Mx : Ochsner-Sherren regime (Conservative).

Monitor :

- Size of lump.
- Tenderness.
- Temperature.
- Pulse rate.

Mx :

- NPO.
- IV fluids
- IV antibiotics.
- Analgesics.

Outcomes

Recovers :

- Discharge.
- Interval appendicectomy after 6 weeks.

Deteriorates (↑Pain, fever & lump size) :

- Suspect abscess.
- Extraperitoneal drainage (Pigtail catheter).

Tumours Of Appendix

00:58:13

Neuroendocrine Tumour (NET) of Appendix :

- m/c tumour of appendix (AKA carcinoid of appendix).
- m/c site : Tip of appendix.

C/f :

- Pain & appendicitis.
- May be detected incidentally.

Mx :

1. Close to the base & >2 cm : Right hemicolectomy.
2. Close to the tip & <2 cm : Simple appendicectomy.

Epithelial Tumours :

A. Non-mucinous : Adenocarcinoma (Mx : Same as colorectal cancer).

B. Mucinous : Gives rise to pseudomyxoma peritonii.

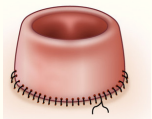
- Mucinous deposits in the peritoneum → Obstruction, distention.
- Mx : Cytoreductive Sx → HIPEC.
  - Hyperthermic intraperitoneal chemotherapy.
  - With Paclitaxel/Mitomycin-C at 41-44°C.
- Seen in appendicular, ovarian & 1° peritoneal tumours.

----- Active space -----

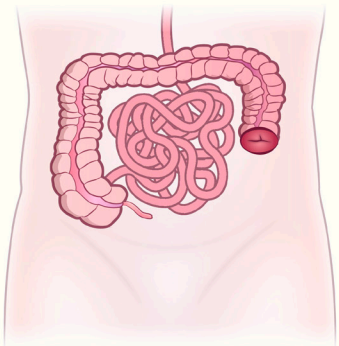
GASTROINTESTINAL SURGERY : PART 3

Ileostomy & Colostomy

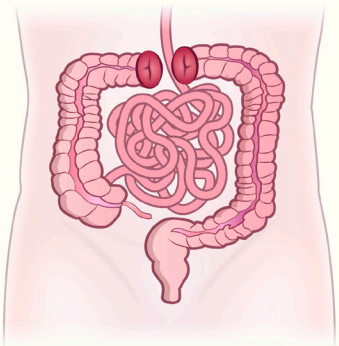
00:00:45

	Ileostomy	Colostomy
Output	More; liquid	Less; semi-solid
Skin excoriation	More	Less
Fluid and electrolyte imbalance	More	Less
Ease of management	-	Easier
Technical difference	Raised above the skin (Pouting) 	Flat (Same level as skin)

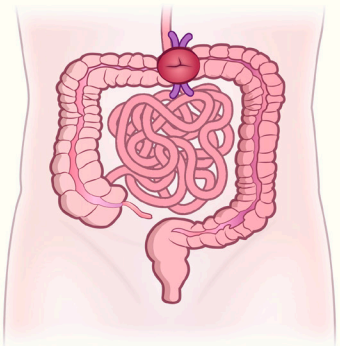
Types of Stoma :



End stoma
One end is taken out



Double barrel
Two ends taken out, not joined to each other



Loop stoma
Two ends taken out but are joined

End colostomy

Double barrel stoma

Loop ileostomy

----- Active space -----

Complications of Stoma :

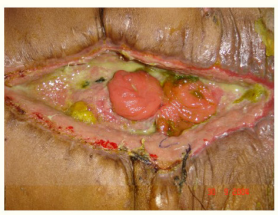
1. Skin excoriation : m/c complication.
2. Parastomal herniation : m/c long term complication.
3. Necrosis : Earliest.
4. Fluid & electrolyte imbalance.
5. Bowel obstruction.
6. Prolapse.
7. Retraction.

Faecal Fistula

00:03:59

Factors Favoring Spontaneous Closure :

1. Esophageal, duodenal, jejunal stump.
2. Enteric wall defects <1 cm.
3. Fistula tract >2 cm.
4. No abdominal wall defect.
5. Good nutrition (Albumin >25 g/L).
6. Low output fistula (<200 mL/day).
7. No FRIEND factors :
   - Foreign body.
   - Radiation.
   - Inflamation, Infection, IBD.
   - Epithelialisation of fistula tract.
   - Neoplasm.
   - Distal obstruction.



Note : High output fistula : >500 mL/day.

Management :

Spontaneous closure
- (+) → Conservative mx.
- (−) → SNAP protocol
  - Skin care, sepsis control.
  - Nutrition.
  - Anatomical delineation (Imaging).
  - Planned surgery.

Prognostic grouping :

	I	II	III
Degree of complexity of fistula	Low	Intermediate	High
mortality	Low	10 – 25%	>25%
Rx goals	Spontaneous closure	Early surgical closure	Late surgical closure

----- Active space -----

Short Bowel Syndrome

00:06:21

Definition : <200 cm of small intestine.

- Net secretors : <100 cm of SI.
- Net absorbers : >100 cm of SI.
- Ileocaecal junction saved → Good prognosis.

Causes :

- Crohn's disease (m/c).
- Superior mesenteric artery (SMA) syndrome.
- Trauma.

Clinical features :

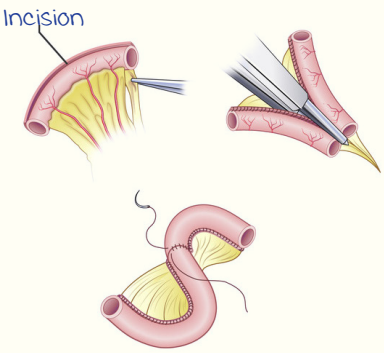
- Malabsorption.
- Diarrhea.
- Weight loss.
- Bacterial overgrowth.

Management :

- TPN.
- Small intestine transplantation.
- Teduglutide (GLP2 analogue).

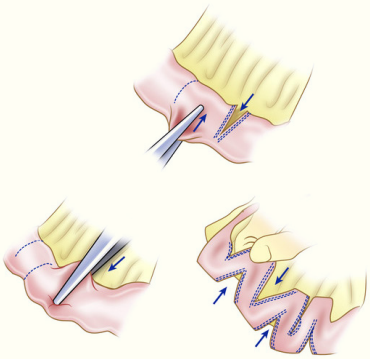
Bowel lengthening procedures :

1.



BIANCHI

2.



STEP

(Serial transverse enteroplasty)

Diverticular Disease

00:08:42

Features :

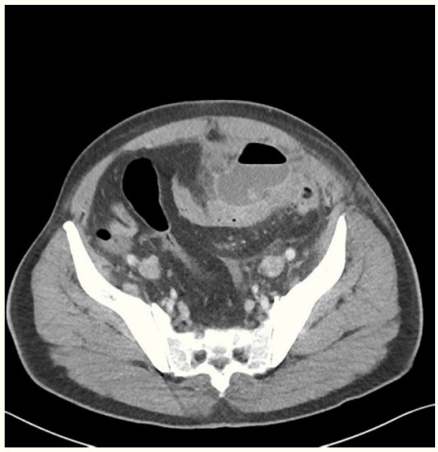
- m/c site : Sigmoid colon.
- False diverticulae (mucosal herniation).
- Forms along mesenteric border.
- 4^{th} – 5^{th} decade; A/w constipation.
- m/c cause of massive lower GI hemorrhage.
- IOC of diverticulosis : Barium enema → Sawtooth appearance.

Sawtooth appearance

----- Active space -----

Complications :

- Bleeding : Right > Left (SMA > IMA).
- Diverticulitis.
- Colorectal cancers.



Diverticulitis with abscess

Diverticulitis :

Clinical features :

- Left lower quadrant pain.
- Diarrhea.
- Fever.
- Raised TLC.

Hinchey staging system : Based on CECT (IOC).

Stage	Features	Management
I	Colonic inflammation with pericolic abscess	Pigtail catheter
II	Colonic inflammation with pelvic abscess	
III	Purulent peritonitis	Laparotomy + Hartmann procedure
IV	Fecal peritonitis	

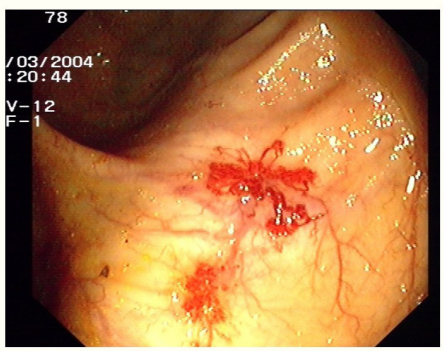
Note : Barium enema/colonoscopy is avoided d/t ↑ risk of perforation.

Angiodysplasia

00:11:32

Features :

- 2nd m/c cause of lower GI bleed.
- Dilated arterioles ⊕.
- m/c site : Caecum.



Angiodysplasia

Clinical features :

- Seen in elderly (5th – 6th decade).
- Heyde syndrome :
  Angiodysplasia + Aortic stenosis.

Management :

Investigation :

- Colonoscopy.
- Capsule endoscopy.

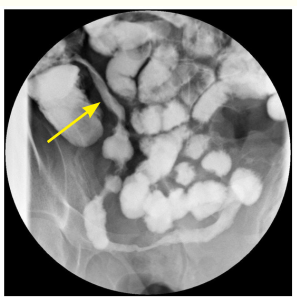
Treatment : Coagulation/cauterisation.

Capsule endoscopy

----- Active space -----

Inflammatory Bowel Disease

00:12:28

	Crohn's disease	Ulcerative colitis
Age	Bimodal peak → 20–40 years, 70 years	25 – 40 years
Sex	F > M	M > F
Smoking	↑ Risk	Protective
Gene	NOD 2/CARD 15	–
Features	• Any portion : Lips to anus • Skip lesion (+) • Anal involvement is common • Relative rectal sparing • Transmural involvement : – Strictures – Colovesical/colovaginal fistulae • Creeping fat • Non-caseating granuloma	• Rectum → Pancolitis → Backwash ileitis • Continuous lesion • Anal involvement uncommon • ↑ Risk of toxic megacolon • Mucosal/Submucosal involvement → Pseudopolyps
Clinical features	• Mimics acute appendicitis • Abdominal pain + diarrhea	• Bloody diarrhea • Toxic megacolon
Diagnosis	Biopsy	
Radiological sign	 String sign of Kantor : • Terminal ileum stricture • Also seen in TB	 Toxic megacolon (Diameter >6 cm) ↓ ↑ Risk of perforation
Medical Mx	Steroids + 5-ASA derivatives	
Surgical Mx	Conservative resection (↑Resection → Short bowel syndrome)	Total proctocolectomy + ileoanal pouch anastomosis (IAPA)

Extraintestinal manifestations :

1. Erythema nodosum.
2. Primary sclerosing cholangitis.
3. Episcleritis, uveitis.
4. Ankylosing spondylitis (A/w HLA B27).

Indications for Sx :

1. Not responding to medical mx.
2. Steroid toxicity.
3. Complications of IBD.
4. Extraintestinal manifestations.

Note : Conditions which do not improve on surgery.

- Primary sclerosing cholangitis.
- Ankylosing spondylitis.

Colonic Polyps

00:17:57 ----- Active space -----

Types :

1. Inflammatory : Ulcerative colitis → Pseudopolyps.
2. Hamartomatous :
   - Seen in Peutz Jegher syndrome.
   - Types :
     - Single juvenile polyp : Not premalignant.
     - Juvenile polyposis : ↑Risk of cancer.
3. Adenomatous polyp : ↑Risk of cancer.

Inflammatory pseudopolyps

Peutz Jegher's Syndrome :

- Gene : STK 11 (chr 19).
- m/c location : Jejunum.
- Increased risk of :
  - Pancreatic cancer (100x).
  - Duodenal cancer.
  - Thyroid cancer.
  - Colonic cancer.

Perioral melanosis

Clinical features :

- m/c presentation : Intussusception.
- Pathognomonic finding : Perioral melanosis.

HPE : Arborising pattern.

Arborising pattern

Adenoma Carcinoma Sequence :

Normal mucosa —APC→ Hyperproliferative epithelium → Early adenoma —K-RAS→ Intermediate adenoma

DCC (Chr 18)

Late adenoma

p53

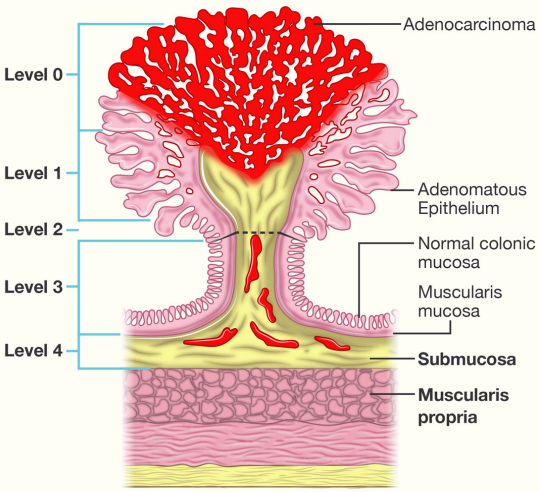
Carcinoma.

AK53
First hit : APC
Last hit : p53

----- Active space -----

Haggit Classification :

- For cancer in a polyp.
- Sessile polyp : Starts at level 4.
- Pedunculated polyp : Includes levels 0 to 4.



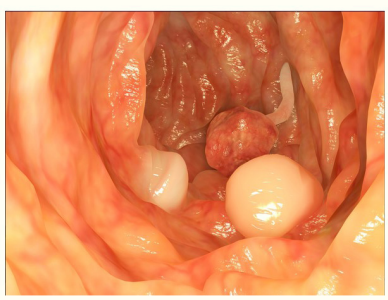
Haggit classification

Familial Adenomatous Polyposis (FAP) :

- Autosomal dominant → APC gene mutation (Chr 5).
- Pathognomonic finding : >100 adenomatous polyps (100% risk of cancer).
- m/c site : Rectum.

Surgery : Total proctocolectomy + IAPA.

Variant	Associated with
Gardner syndrome	• FAP • Sebaceous cysts • Osteomas • Desmoid tumour
Turcot's syndrome	• FAP • CNS tumours : – Gliomas – Medulloblastomas


Familial Adenomatous Polyposis (FAP)

Screening : Genetic counselling + Testing for 1st degree relatives

↓

If mutation ⊕

↓

Screening from age 10 yrs : Sigmoidoscopy.

MUTYH Associated Polyposis :

- Similar to FAP.
- Autosomal recessive → APC mutation not identified.
- Multiple colonic polyps.
- 3–6x risk of cancer.
- Surveillance for duodenal adenomas : 2 year colonoscopies.

HNPCC :

- Hereditary non-polyposis colonic cancer syndrome.
- Defect in mismatch repair genes (MLH, MSH).

----- Active space -----

Modified Amsterdam criteria :

1. Rule out FAP.
2. At least 3 relatives affected by HNPCC tumours of which at least 1 should be a first degree relative.
3. 2 consecutive generations affected.
4. At least one should develop tumours at <50 years.

Lynch syndrome :

Lynch 1	Lynch 2
Colorectal cancers are m/c	• Extracolonic cancers • m/c : Uterine, cervical

Colorectal Cancers (CRC)

00:24:45

m/c site : Rectum > Rectosigmoid > Sigmoid.

Screening :

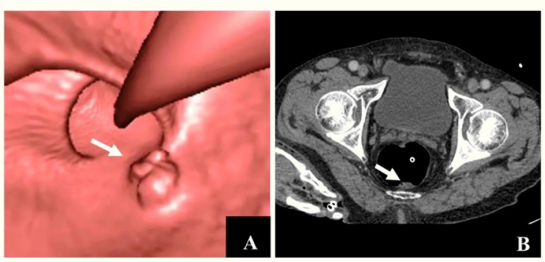
- Starts : 50 years of age.
- If Family history ⊕ : 10 yrs before diagnosis of youngest relative.

Modalities :

	Colonoscopy	Sigmoidoscopy	FOBT
Duration	Every 10 years	Every 5 years	Annually
Length of scope	110 – 140 cm (Rectum to caecum visualised)	60 – 90 cm	-

Virtual colonoscopy :

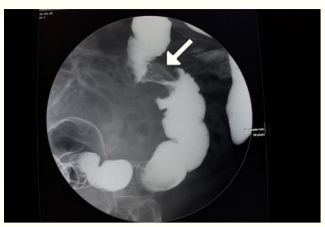
- CECT f/b 3D reconstruction.
- Used for screening.
- Advantages :
  - Better extracolonic details.
  - Better patient compliance.
- Disadvantage : Mucosal details are not well appreciated.



Virtual colonoscopy

Investigations of Choice :

- Diagnosis : Colonoscopic biopsy.
- Staging : PET-CT.
- T & N staging for rectal Ca : MRI with endorectal coil.


Apple core deformity

----- Active space -----

Presentation :

Right sided CRC	Left sided CRC
Ulcero-proliferative growth → Bleed → Iron deficiency anemia	• Annular growth • Altered bowel habits } Early onset • Bowel obstruction • Apple core deformity (Radiology)

Duke's Staging :

Depends on depth of the tumour.

A : Mucosa + Submucosa involved.

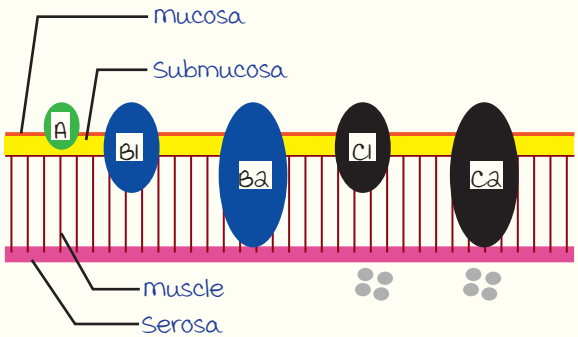
B : Muscle involvement with no LN.

- B1 → Into muscle layer.
- B2 → Beyond muscle layer.

C : Muscle involvement with LN positive.

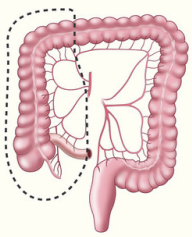
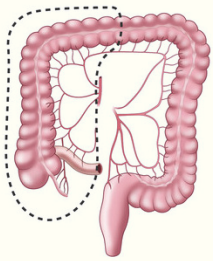
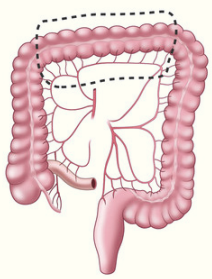
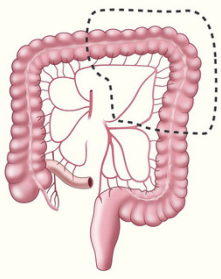
- C1 → Into muscle layer.
- C2 → Beyond muscle layer.

D : Distant metastasis.



Management :

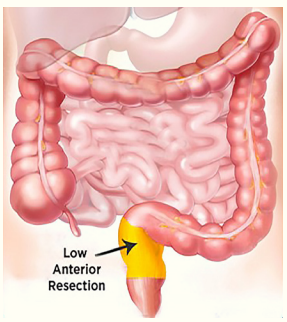
Surgery : Colectomy.

A. Right hemicolectomy	B. Extended right hemicolectomy
• Lesion in caeum • Structures removed : – Terminal ileum : 10–12 cm – Ascending colon – 1/3rd of transverse colon 	Half of transverse colon removed 
C. Transverse colectomy	**D. Left hemicolectomy**
Only Traverse colon removed completely 	Lesion in splenic flexure 

----- Active space -----

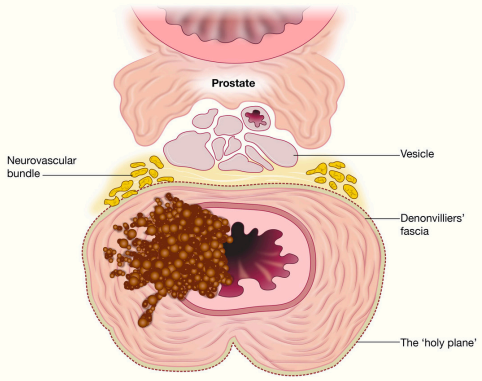
Surgery in rectal lesions :

Tumour location	Procedure	Structures removed
> 5 cm from anal verge	Low Anterior Resection (LAR) + Colo-anal anastamosis (Sphincters spared)	• Rectum • Part of sigmoid
< 5 cm from anal verge	Abdomino-Perineal Resection (APR) + Permanent end colostomy (Sphincters cut)	• Rectum • Anal canal • Part of sigmoid



LAR

APR



Plane of dissection

Plane of dissection for LAR/APR :

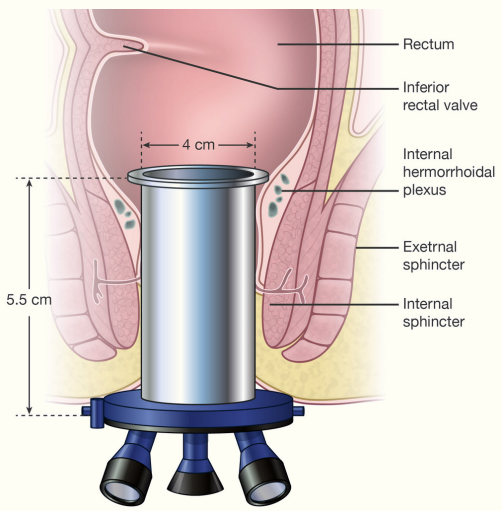
- B/w neurovascular bundle of prostate & Sacrum.
- Total mesorectal excision : To remove lymph nodes.

Complications of surgery :

Nerve injured	Procedure	Clinical features
Superior hypogastric plexus or it's branches	High IMA ligation	Retrograde ejaculation
Pelvic plexus	Division of lateral stalks close to pelvic sidewall	Erectile dysfunction, impotence, atonic bladder
Periprostatic plexus	Anterior dissection	Sexual & bladder dysfunction

TaTME :

- Transanal total mesorectal excision.
- Type of NOTES procedures.
- Done in early rectal cancers (T1, T2).



TaTME

Anal Carcinoma :

- Usually SCC.
- Mx : Nigro's regime x 1 month (Combined chemoradiation).

↓

If residual disease/recurrence ⊕

↓

Surgery : APR.

----- Active space -----

Pilonidal Sinus

00:34:43

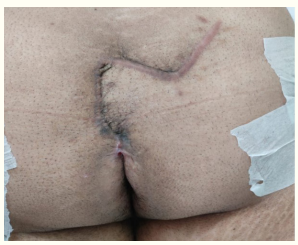
Features :

- Sinus/abscess in natal cleft.
- D/t ingrowing of hair.
- Seen m/c in hairy men.
- AKA jeep driver's disease.

Management :

- Excision → Rhomboid/Limberg flap.
- Bascom's technique.
- Kardayakis surgery.

Pilonidal sinus



Rhomboid flap

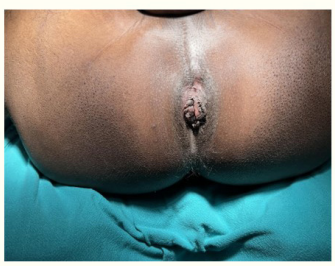
Hemorrhoids/Piles

00:35:54

Dilated vascular channels → Bleeding from sinusoids.

m/c cause of bleeding P/R.

1° hemorrhoids location : 3, 7, 11 o' clock.



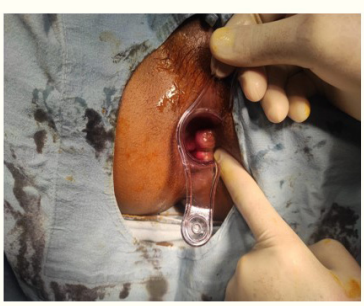
External hemorrhoids

Clinical Features :

- Painless bleeding P/R.
- Constipation.
- Painful if :
  - External (Below dentate line).
  - Thrombosed hemorrhoids/Meleney's 5 day self healing lesion : Felt on DRE.

Investigation :

IOC : Proctoscopy.



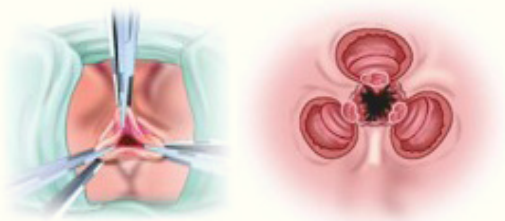
Proctoscopy

Thrombosed piles

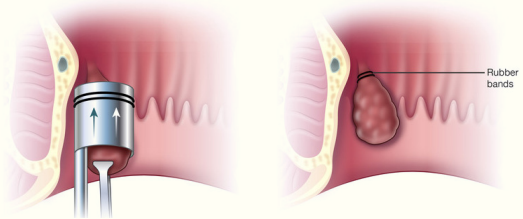
----- Active space -----

Grades & Management of Piles :

Grade	Description	Management
I	Only bleeds; no prolapse	1. High fibre diet + ↑ fluid intake 2. Laxatives 3. Sitz bath
II	Prolapse but spontaneously reduces	Grade I Mx + Banding/Sclerotherapy
III	Prolapse ; Have to be pushed inside	1. Hemorrhoidectomy : – Open : Milligan morgan – Closed : Ferguson 2. Stapled hemorrhoidopexy : TOC 3. DGHAL (Doppler guided hemorrhoidal artery ligation)
IV	Remains prolapsed	



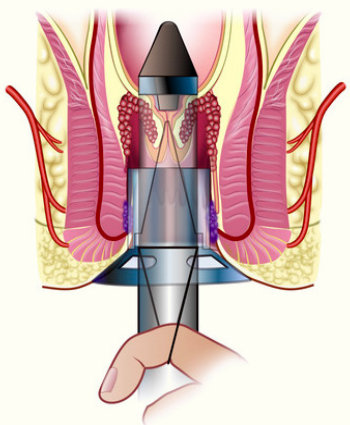
Open hemorrhoidectomy :
Hemorrhoid resection ⟶ wound left open



Banding (Barron's band)

Complications of Hemorrhoid Surgery :

1. Urinary retention (m/c).
2. Reactionary hemorrhage.
3. Pain.
4. Stenosis.
5. Incontinence.
6. Recurrence.



Stapler hemorrhoidopexy

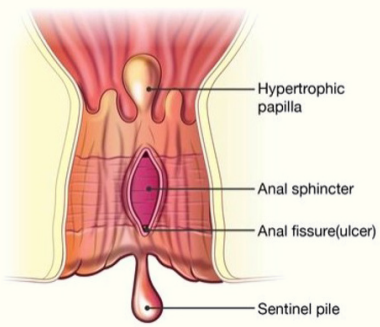
Anal Fissure

00:40:07

Breach in epithelium, m/c site : Posterior midline.

Clinical Features :

1. Painful bleeding P/R.
2. Constipation.
3. Skin/Sentinel tag ⊕
   (Chronic anal fissure : >4 weeks).



Chronic anal fissure

----- Active space -----

Management :

IOC : External inspection (DRE is C/I).

Rx :

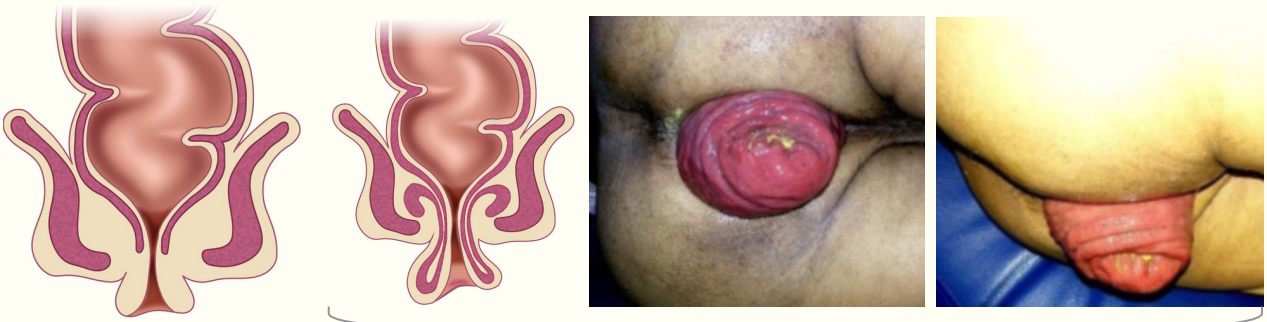
1. Lifestyle changes.
2. Laxative.
3. Local xylocaine, CCB cream.
4. Surgery : If medical mx fails.
   - Lateral anal sphincterotomy.
   - Anal advancement flap.

Rectal Prolapse

00:41:30

Types :

Partial thickness	Full thickness/complete
• Mucosal prolapse • Common in children • D/t incomplete sacral curve	• All layers prolapse • Common in adults • D/t weak pelvic floor



Partial prolapse

Complete prolapse

Management :

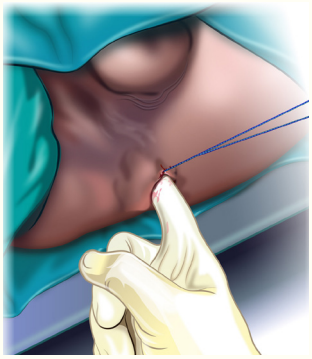
Partial thickness prolapse :

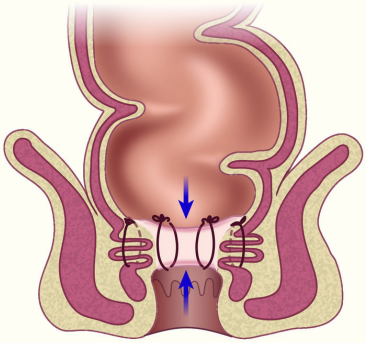
- First episode : Digital repositioning.
- Recurrent :
  - Thiersch wiring.
  - Sclerotherapy.

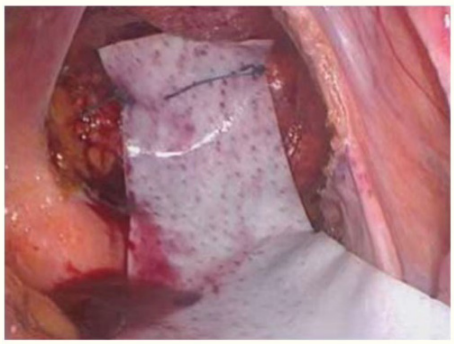
Complete thickness :

Perineal procedures	Abdominal procedures
Easy to perform	Difficult to perform
Less complications	↑↑ complications
High recurrence rate	Least recurrence rate
1. Thiersch repair : Purse string sutures 2. Delorme's repair : Plication of prolapse 3. Altemier : Perineal rectosigmoidectomy	1. Ripstein rectopexy 2. Weil rectopexy 3. Goldman Frykberg : Resection rectopexy

----- Active space -----


Thiersch wiring


Delorme's repair


Rectopexy

Anorectal Malformations

00:44:20

Level of anomaly	Male	Female
High	Rectovesical fistula	Rectovaginal fistula
Low	Anal stenosis	Anal agenesis
Miscellaneous	-	Persistent cloacal anomaly

A/w other malformations : VACTRL.

Invertogram :

Done 24 hours after birth.

Patient is inverted

↓

Metallic marker is placed at anal opening

↓ X-ray taken

Distance b/w gas bubble & marker measured :

- <2 cm : Low anomaly.
- >2 cm : High anomaly.


Invertogram

Note : MRI is IOC.

Mx : Surgery to bring the rectum down.

Anorectal Abscess & Fistula

00:46:31

Forms close to the dentate line

Source of infection : Anal glands.

Perianal Abscess :

C/f : Pain & fever.

Mx : Incision & drainage.

Complication : Perianal fistulae.

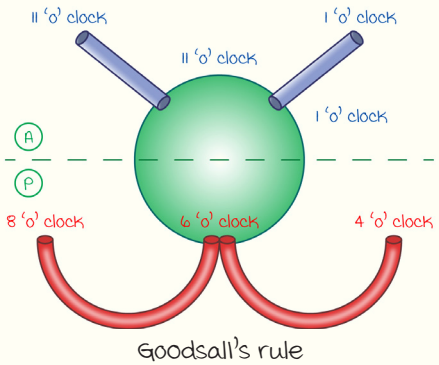

Perianal abscess

----- Active space -----

Perianal Fistula :

Complication of improperly managed perianal abscess.

Clinical features : Pus discharge P/R.



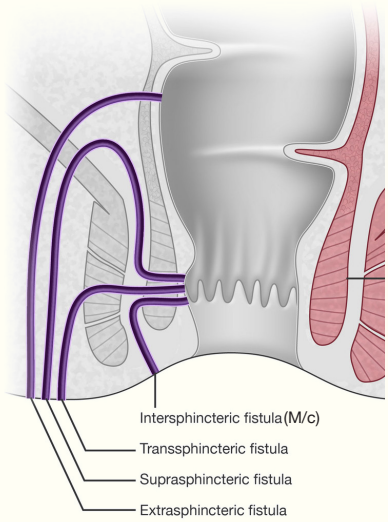
Goodsall's rule

Goodsall's rule :

- Imaginary line drawn through the anal verge.
- Fistulae anterior to the line → Straight tracts.
- Fistulae posterior to the line → Curved tract.
- Exception : Long anterior fistula (>3 cm).

Park's classification :

IOC : MR fistulogram.



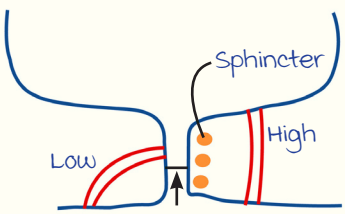
Watercan perineum :

Multiple perianal fistulae.

Causes :

- Crohn's disease.
- Trauma.
- TB.
- Cancer.
- Immunocompromised patient.

Types of fistulae



Based on internal opening :

- Above anorectal ring : High.
- Below anorectal ring : Low.

Management :

1. Low fistulae :
   - Fistulectomy/Fistulotomy.
   - LIFT (Ligation of fistulous tract).
   - VAFT (Video assisted fistula therapy).
2. High fistulae : Seton's procedure (↓Chance of incontinence).

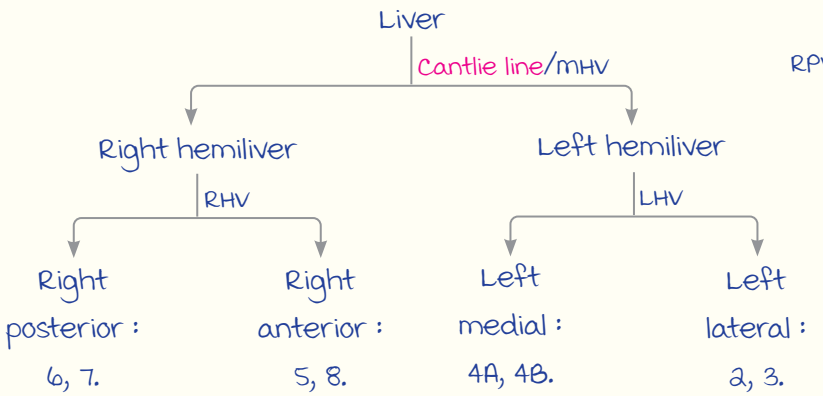
HEPATOBILIARY & MINIMALLY INVASIVE SURGERY

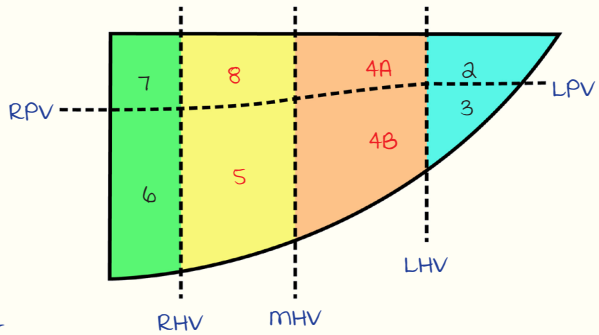
----- Active space -----

Surgical Anatomy of Liver

00:00:52

Couinaud Segments :





MHV : Middle hepatic vein
LHV : Left hepatic vein
RHV : Right hepatic vein
RPV/LPV : Right/Left portal vein
: Liver sectors (4)

Note : Cantlie's line joins IVC to gallbladder.

Other Features :

- Structures dividing liver : Portal vein & hepatic veins.
- Portal veins of either side → Superior & inferior divisions.

Segment	Significance	Feature
7	Bare area	M/c site for amoebic liver abscess.
4B & 5	Gall bladder (GB) fossa	Removed in radical cholecystectomy in GB Ca.
1	Caudate lobe	Hypertrophied in Budd Chiari syndrome. (D/t direct drainage into IVC.)

Fissures :

- Major fissures (3) : LHV, MHV, RHV.
- Minor fissures (3) : LPV, RPV, Fissure of Ganz.

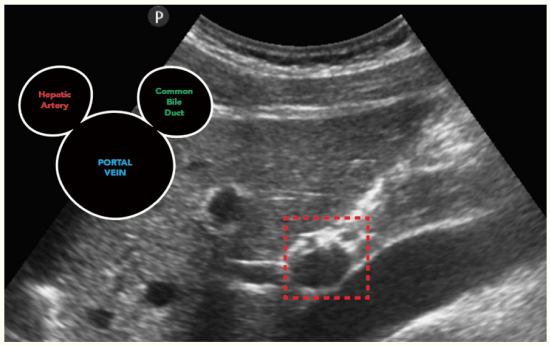
Brisbane Classification of Liver Resection :

Procedure	Segments removed
Left hepatectomy	2, 3, 4A & 4B
Right hepatectomy	5, 6, 7 & 8
Left trisectorectomy (Extended left hepatectomy)	2, 3, 4A, 4B, 5 & 8
Right trisectorectomy (Extended right hepatectomy)	5, 6, 7, 8, 4A & 4B

----- Active space -----

Liver Pedicle :

- Duplex scan : Mickey mouse sign.
- Formed by :
  i. Hepatic artery.
  ii. Common bile duct.
  iii. Portal vein.



Mickey mouse sign

Liver Abscess

00:05:08

	Amoebic	Pyogenic
Organism	Entamoeba histolytica	• m/c : E. Coli. • m/c in asia : Klebsiella. • Chronic granulomatous disease : S. aureus.
Route of infection	Small/large bowel infection ↓ Portal vein (Laminar flow towards right) ↓ m/c segment affected : 7.	Ascending cholangitis (via biliary tree).
No. of abscesses	Solitary	• 50% Solitary • 50% Multiple
C/f	Right hypochondriac pain + fever	
	-	more toxic/sick.
Labs	• ↑↑PT/INR • Aspirate : Anchovy-sauce pus.	↑↑ALP
IOC	CECT (Pus collection) 	
Mx	Metronidazole (800 mg) TDS Not responding : Drainage with pigtail catheter → Other indications : • 2° infections • Abscess cavity >5cm • Left lobe abscess • Pregnancy • Impending rupture. Responding : Continue for 2-3 wks.	• Broad spectum IV antibiotics • Early drainage with pigtail catheter

Hydatid Cyst

00:08:15 ----- Active space -----

Features :

Organism : Echinococcus granulosus.

Definitive host : Dog.

Intermediate host : Sheep.

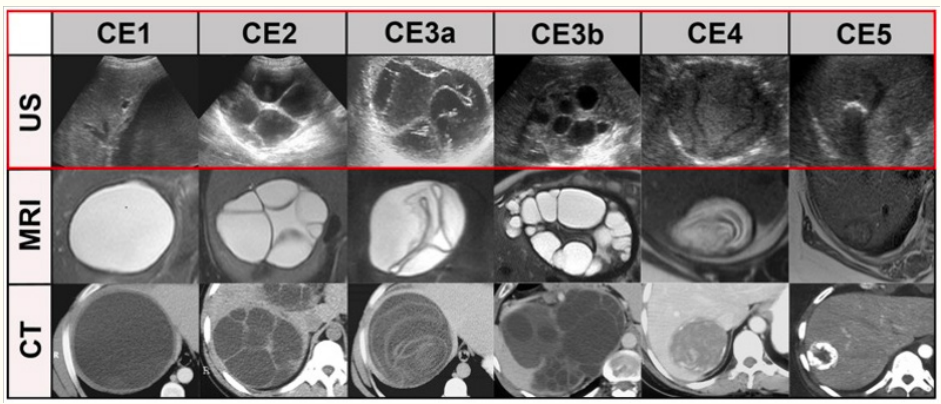
Accidental intermediate host : Man.

C/f : Right hypochondruim pain.

IOC : CECT

Classification :

WHO-IWGE 2001	Gharbi 1981 (USG based)	Description
CE 1	Type I	Unilocular anechoic cystic lesion with double-line sign.
CE 2	Type III	Multiseptate, Rosette-like, Honeycomb cyst.
CE 3a	Type II	Cyst with detached membranes (Water-lily sign).
CE 3b	Type III	Cyst with daughter cysts in a solid matrix.
CE 4	Type IV	Cyst with heterogeneous hypoechoic/hyperechoic contents. No daughter cysts.
CE 5	Type V	Solid cyst with a calcified wall (Dead cyst).



Management :

1. Albendazole (First line).
2. PAIR :
   - Percutaneous Aspiration, Injection, Re-aspiration.
   - Aspirate fluid → Inject scolicidal : → Reaspirate agent.
     - Hypertonic saline (m/c).
     - Cetrimide
     - Mebendazole
     - Alcohol

Note : Formalin not used. (Causes chemical cholangitis).

Water-lily sign

----- Active space -----

- C/I for PAIR :
  a. Dead cyst.
  b. Calcified cyst.
  c. Extrahepatic cyst.
  d. Deep seated cyst.
  e. Multiloculated cyst.
  f. Cystobiliary communication.

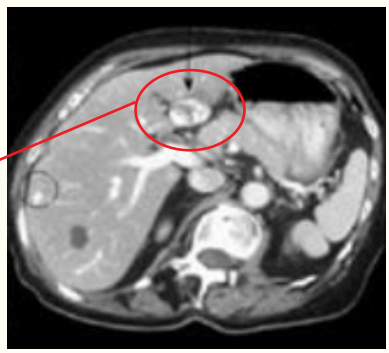
3. Surgery :
   - Done if PAIR is C/I.
   - Liver resection or cystopericystectomy.

Benign Liver Tumours

00:12:15

Liver Hemangioma :

- m/c benign tumour of liver.
- Usually asymptomatic.
- CT : Peripheral nodular enhancement.
- No surgical intervention required.



Liver hemangioma

Hepatic Adenoma :

- A/w OCP intake.
- Risk of malignant conversion : 10%.
- F >> M.

Clinical presentation :

- Mostly symptomatic (Right hypochondrium pain/lump).
- Hemoperitoneum (D/t spontaneous rupture).

Investigations :

- IOC : CECT.
- HPE :
  - Sheets of hepatocytes.
  - No ducts.
  - No Kupffer cells.

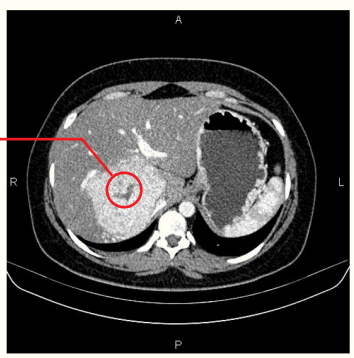
Bordeaux classification :

- Inflammatory : Highest bleeding risk.
- β-catenin mutated : ↑Risk of cancer.
- HNF 1α mutated :
  - Young pts.
  - Multiple lesions.

Management : Resection (Indications : Ⓝ >5 cm, High risk : >2 cm).

Focal Nodular Hyperplasia (FNH) :

- Etiology : ↓Blood supply.
- HPE :
  - Hepatocytes.
  - Bile duct structures.
  - Kupffer cells ⊕ : Hotspot on Tc^{99} scan.
- IOC : CECT ⟶ Central stellate scar.
- Mx : Conservative.



Central stellate scar

Hepatocellular Carcinoma (HCC)

00:14:41 ----- Active space -----

- m/c 1° malignant tumour of liver : HCC.
- m/c malignant tumour of liver : metastasis.

Risk Factors :

1. HBV.
2. HCV.
3. Alcohol.
4. Obesity.
5. Thorotrast.
6. Aflatoxin.
7. DM.
8. NASH/NAFLD.

Note : Thorotrast is a/w HCC, cholangiocarcinoma & renal cell carcinoma.

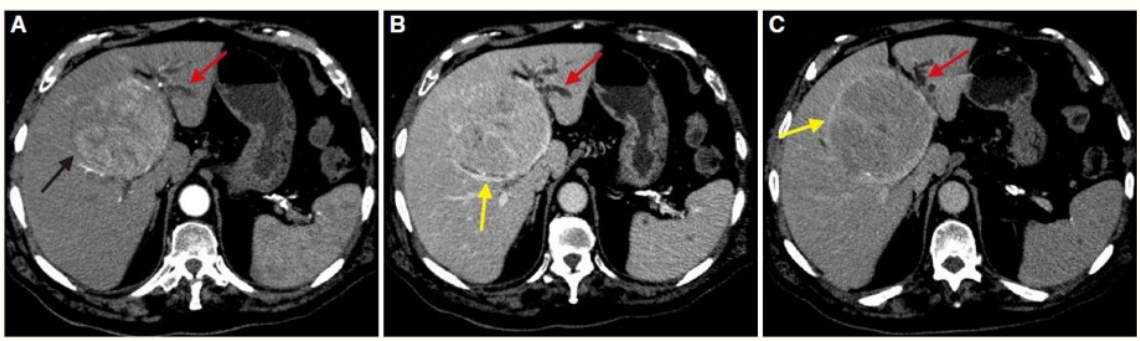
Features :

- M > F.
- m/c presentation : Hepatomegaly (Hard & nodular liver).
- Paraneoplastic syndromes :
  - Hypoglycemia (m/c).
  - Hyperlipidemia (m/c biochemical).
  - Cushing's syndrome.
  - Gynecomastia.
  - Hypercalcemia.

Investigations

1. Triple phase CT : IOC, used for LIRADS score.

Phases	Finding
A : Non contrast	Hypodense
B : Arterial	Enhancement
C : Venous	Early washout



Note :

- In triple phase CT of metastasis, all phases are hypodense.
- AFP (α-fetoprotein) : Tumour marker for HCC.

2. Biopsy : Confirms diagnosis.

----- Active space -----

Child-Turcotte-Pugh Score :

Used to assess functional liver tissue.

Clinical and lab criteria	Points		
	1	2	3
Encephalopathy	None	Mild to moderate (Grade 1 or 2)	Severe (Grade 3 or 4)
Ascites	None	Mild to moderate (Diuretic responsive)	Severe (Diuretic refractory)
Bilirubin level (mg/dL)	<2	2-3	>3
Albumin level (g/dL)	>3.5	2.8-3.5	<2.8
Prothrombin time : • Seconds prolonged (s) • International Normalized Ratio (INR)	<4 <1.7	4-6 1.7-2.3	>6 >2.3

Class A (5-6) : Least severe.

Class B (7-9) : Moderately severe.

Class C (10-15) : Most severe.

MELD & PELD Score :

MELD

(Model for end stage liver disease) :

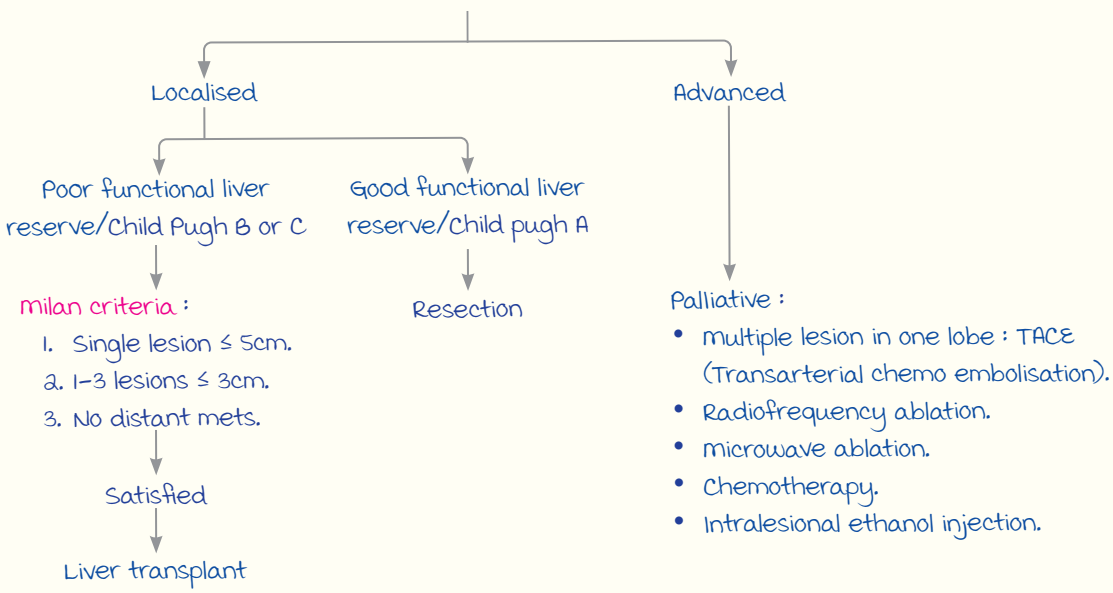
1. Creatinine.
2. Serum bilirubin.
3. INR.

PELD

(Pediatric end-stage liver disease) :

1. Albumin.
2. Total bilirubin.
3. INR.
4. Growth failure.
5. Age (<1yr).

Management :



Barcelona clinic criteria :

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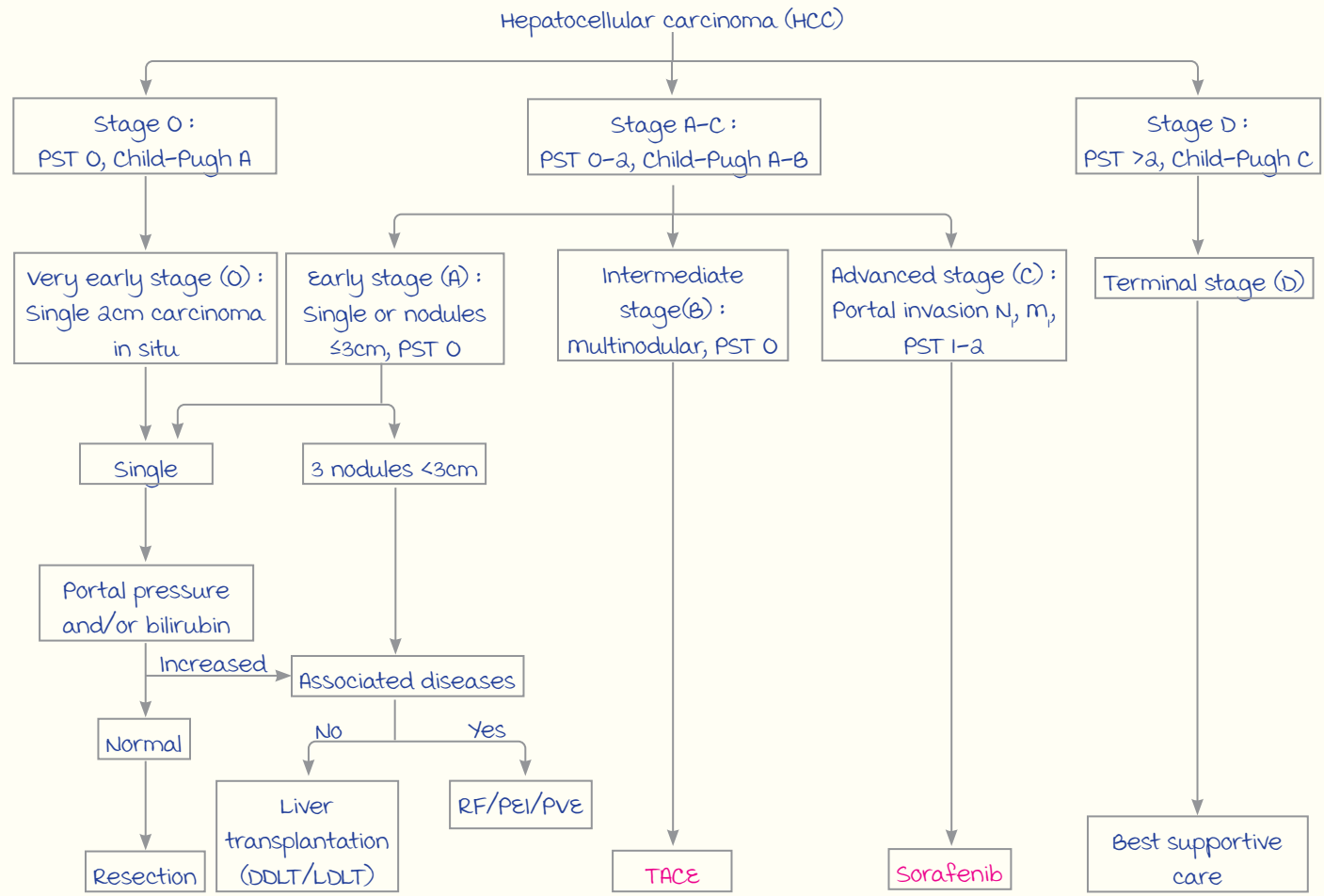


RFA : Radiofrequency ablation.

PVE : Portal vein embolization.

PEI : Percutaneous ethanol injection.

Prognostic indicators for HCC
OKUDA : BATA
B → Bilirubin
A → Ascites
T → Tumor size
A → Albumin

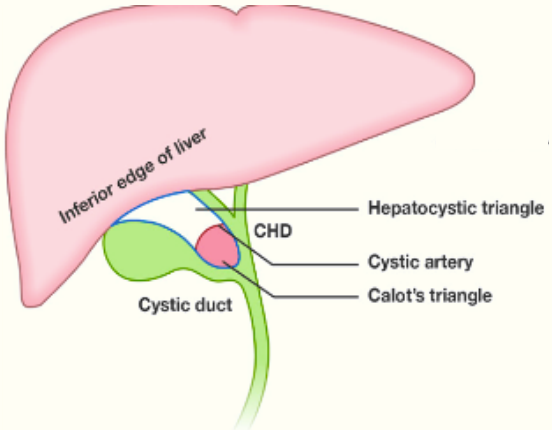
Fibrolamellar variant of HCC
• m/c in young females
• Occur in non cirrhotic liver
• AFP not raised
• Tumour marker : Neurotensin B
• Good prognosis

----- Active space -----

Surgical Anatomy of GB

00:23:28

Hepatocystic triangle	Calot's triangle
Boundaries : • Inferior edge of liver • Common hepatic duct (CHD) • Cystic duct Contents : • Cystic artery (From right hepatic artery) • Calot's triangle.	Boundaries : • Cystic artery • Common hepatic duct • Cystic duct Contents : Cystic lymph nodes of Lund.



Moynihan's Hump :

- Tortuous right hepatic artery.
- Lies in front of Calot's triangle.
- Injury → Torrential bleeding.

Cystic Plate :

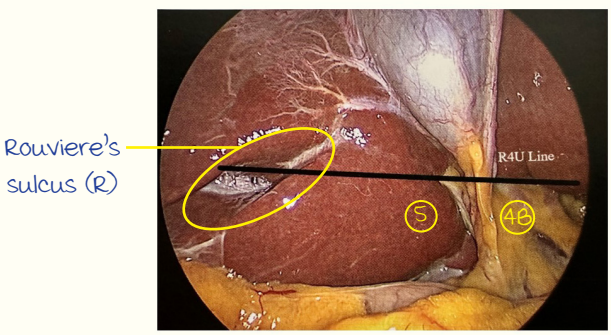
- Flat, ovoid fibrous sheet, continuous with the liver capsule of segments 4 & 5.
- Location : GB bed.
- Exposure → Critical view of safety during lap. cholecystectomy.

Rouviere's Sulcus :

- Under surface of the right lobe of the liver → Right of the hepatic hilum.
- Marks position of right posterior sectoral pedicle.

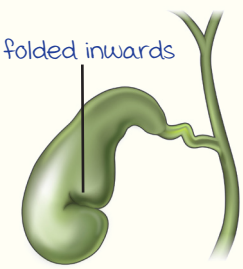
R4U line :

- Line joining rouviere's sulcus (R), Segment 4B & Umbilical fissure.
- Above : Cystic artery + Cystic duct.
- Below : CBD.
- Dissection to be done above R4U line during cholecystectomy.



Phrygian Cap :

- Physiological variant.
- Not an indication for cholecystectomy.
- Not a risk for cancer.



Phrygian cap

USG

Gall Stones

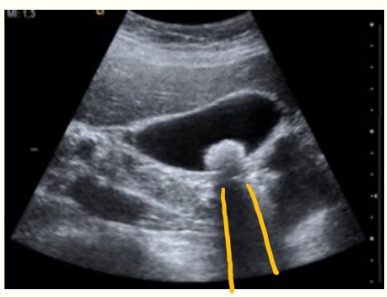
00:27:44 ----- Active space -----

TYPES

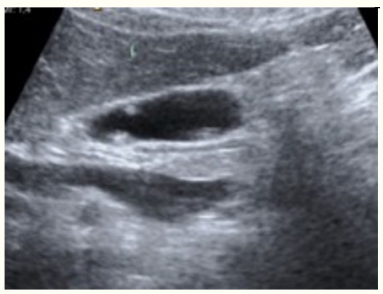
- Pure cholesterol stones
- Mixed stones
  - m/c overall.
  - Cholesterol + pigment.
- Pigment stones :
  - m/c in Asia.
  - <30% cholesterol.
    - Black pigment stones :
      - Composition : Insoluble bilirubin pigment + $CaPO_4$ + $CaHCO_3$.
      - Hemolytic conditions :
        - Sickle cell anemia.
        - Hereditary spherocytosis.
    - Brown pigment stones :
      - Composition : Ca bilirubinate, Ca palmitate, Ca stearate.
      - Infected bile :
        - Clonorchis.
        - Cholangitis.

INVESTIGATIONS

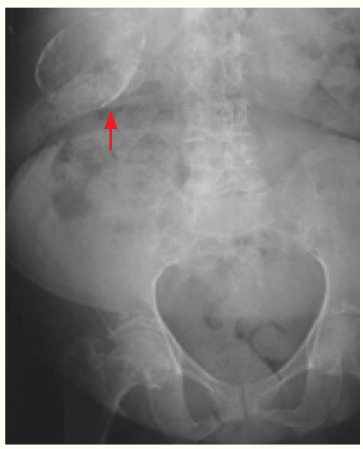
IOC : USG Abdomen : Posterior acoustic shadow (+)



Gallstones



GB polyp : No shadow



Porcelain GB

PRESENTATION

1. Asymptomatic :

Indications for surgery :

a. Porcelain GB (Calcification of GB wall) : ↑Risk of malignacy by 10%.

b. Polyp > 1 cm.

c. Salmonella typhi carrier.

d. DM.

e. Stone size >2 cm.

2. Acute Cholecystitis :

Tokyo guidelines for diagnosis :

a. Local signs of inflammation etc :
   1. Murphy's sign.
   2. Right upper quadrant pain/tenderness/mass + Nausea & vomiting.

b. Systemic signs of inflammation, etc :
   1. Fever.
   2. Elevated CRP.
   3. Elevated WBC count.

c. Imaging findings :
   1. Thickened GB wall.
   2. Probe tenderness.
   3. Pericholecystic fluid.

Suspected diagnosis : 1 item in A & B but not C.
Definitive diagnosis : 1 item in A+B+C.

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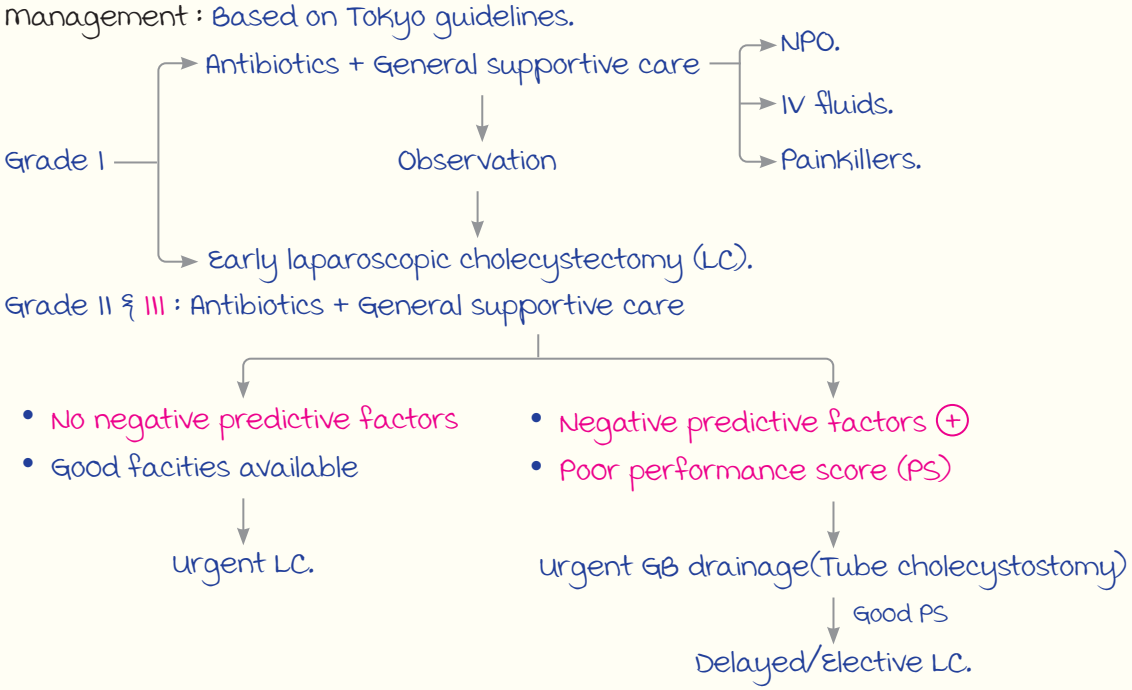
Note : HIDA scan for acalculous cholecystitis.

Grading of cholecystitis (Tokyo consensus guidelines) :

Grade	Severity	Features
Grade III	Severe acute cholecystitis	Organ dysfunction
Grade II	Moderate acute cholecystitis	Any 1 of the following : • Elevated white cell count > 18000/mm^3. • Palpable tender mass in right upper abdominal quadrant. • Duration of complaint >72 hours. • Marked local inflammation. (Emphysematous/ gangrenous cholecystitis, pericholecystic abscess, biliary peritonitis).
Grade I	Mild acute cholecystitis	No organ dysfunction & mild inflammatory changes.

Management : Based on Tokyo guidelines.



Note : Chronic cholecystitis (D/t repeated attacks) → Mx : Cholecystectomy

3. Mucocele :

- Aseptic dilatation of GB with mucus.
- D/t impacted stone at neck of GB (Hartman's pouch).
- Infected → Empyema.
- Mx : Cholecystectomy.

----- Active space -----

4. Mirizzi's Syndrome :

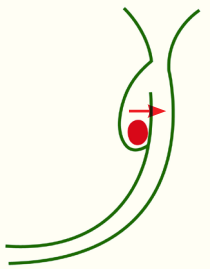
GB adherent to CBD → Stone pushes → Obstruction → Fistula b/w CBD & GB against CBD

C/F : Obstructive jaundice + ↑ALP.

IOC : MRCP (Magnetic resonance cholangiopancreaticography).

Mx :

- Ideal : Cholecystectomy + Fistula repair.
- Adherent GB : Subtotal cholecystectomy.



Fistula formation

5. Gallstone Ileus :

2° to cholecystoduodenal fistula → Dynamic bowel obstruction (M/C site : Last 60cm of ileum).

Investigations :

a. X-ray abdomen : Erect & supine

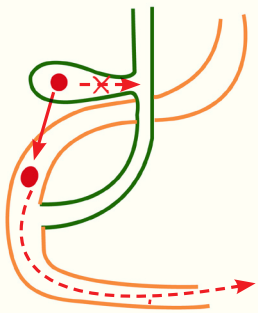
Riggler's triad seen :

i. Pneumobilia.

ii. Features s/o SI obstruction.

iii. Radio opaque shadow in Rt lower quadrant.

b. CECT : IOC.



Management :

a. Mx of intestinal obstruction.

b. 2nd S_x (Cholecystectomy + Fistula repair).

Complication :

Bouveret syndrome : Gall stone causing gastric outlet obstruction.

6. Choledocolithiasis :

Stones in the CBD

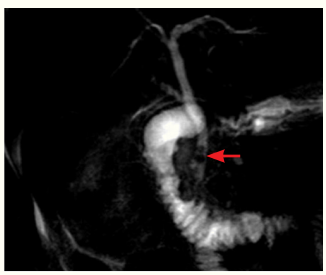
Presentation :

- Asymptomatic.
- Obstructive Jaundice. (↑ALP).
- Cholangitis : Charcot's triad.

Charcot's triad	Reynolds pentad
Pain + Fever + Jaundice (Intermittent)	Charcot's triad + Septic shock + Altered mental status

Investigations :

1. MRCP : IOC.
2. Endoscopic ultrasound (EUS) : IOC for CBD microliths.



MRCP : Choledocholithiasis

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Risk factors for CBD stones :

Risk of CBD stones	History of cholangitis or pancreatitis	Liver function tests	Abdominal USG : CBD diameter	Further evaluation required
Low, 2–3%	Absent	Normal	≤6 mm	None
Medium, 20–40%	Present	2x normal	8–10 mm	MRCP +/– ERCP stone extraction
High, 50–80%	Present, with jaundice	2x normal	≥10 mm	MRCP +/– ERCP stone extraction

Management :

1. CBD/GB stone detected before cholecystectomy :
   ERCP F/b → Cholecystectomy.
2. CBD Stones detected during surgery :

Lap cholecystectomy +
Exploration of CBD to remove stones
↓
T-Tube insertion → Dye injected after 5–7 days

- No residual stones : Remove T-Tube.
- Stones ⊕ → Burhenne's technique : Retain T-Tube → 2–3 wks → Remove stones using choledochoscope.

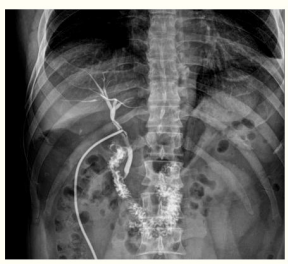
3. Stones detected after surgery :
   - Within 2yrs : Residual stones.
   - After 2 years : Recurrent/1° CBD stones.

   → ERCP

ERCP

- Side viewing endoscope used
- Endoscope visualised
- S/E : Pancreatitis

T-Tube



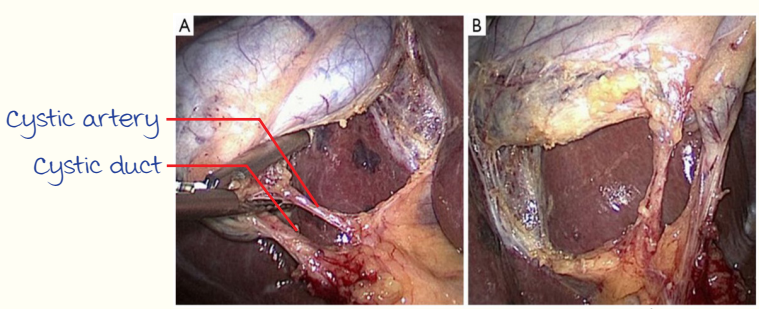
T-tube cholangiogram

Laproscopic Cholecystectomy

00:45:39

Be safe method

Visualise the following :
- Bile duct.
- Sulcus of rouviere.
- Hepatic artery.
- Umbilical fissure.
- Duodenum.



Critical view of safety (Lap. view)

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Bailout strategies :

Indication : Standard lap. cholecystectomy fails/not feasible.

1. Abort the procedure.
2. Convert to open procedure.
3. Tube cholecystostomy using 14f foley's.
4. Subtotal cholecystectomy.
5. Fundus first procedure.

Complications :

1. Right shoulder tip pain (m/c) : D/t retained co_2 irritating diaphragm.
2. Bleeding.
3. CBD injury.
4. Residual/recurrent stones.
5. Post cholecystectomy syndrome : Pain d/t to → Retained stones.
   → Sphincter of oddi dysfunction.

Bile Duct Injury :

Bile leak during surgery : Surgical repair.

Bile leak after surgery :

MRCP showing bile leak

Bile leak after surgery

Minor leak
- Patient is stable
- No fever

→ Conservative mx.

Major leak :
- Fever (+)
- Jaundice (+)
- Pain (+)
- USG : Collection (+)

Within 24–48 hrs :
Re-explore & Repair.

>48 hrs :
- Antibiotics.
- Pigtail drainage of collection → MRCP (IOC).
- ERCP followed by stenting.

Bismuth & Strasberg Classification :

Bile duct injury	Bismuth	Strasberg
Cystic duct leak or leaks from small ducts in liver bed	–	A
Occlusion of aberrant right hepatic duct (RHD)	–	B
Leak from an aberrant RHD	–	C
Lateral injury to CBD (<50% circumference)	–	D
Common hepatic duct (CHD) stricture, stump >2 cm	Type I	E1
CHD stricture, stump <2cm	Type II	E2
Hilar stricture with preserved biliary confluence	Type III	E3
Hilar stricture with involvement of confluence	Type IV	E4
Stricture to an aberrant RHD and to CHD	Type V	E5

Note :

Hannover classification → Bile duct + Vascular injury.

----- Active space -----

Gallstones in Pregnancy :

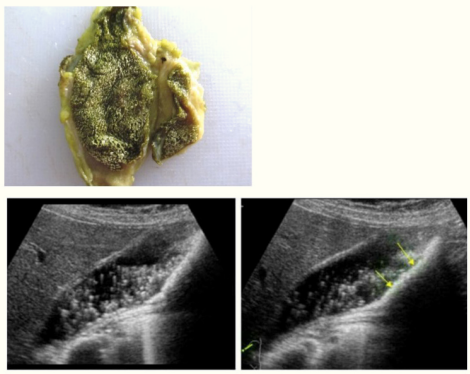
- Hormonal changes :
  ↑Cholesterol secretion.
  +
  ↓Bile acid secretion
  +
  ↓GB emptying
  (D/t progesterone).
  → ↓Ability of bile to solubilise cholesterol → Promotes formation of stones.
- First trimester : Conservative Mx (Avoid NSAIDs).
- Second trimester : Moderate/Severe disease → Lap cholecystectomy.
- Third trimester : Conservative Mx.

GB Cancer

00:51:00

Risk Factors :

1. Gallstones (90%).
2. Salmonella typhi carrier.
3. Porcelain gall bladder.
4. GB polyps (>1 cm in size, multiple).
5. Abnormal pancreatico-biliary duct Junction (APBDJ) : ↑Risk of GB cancer & cholangiocarcinoma.
6. Heavy metal contamination of water.

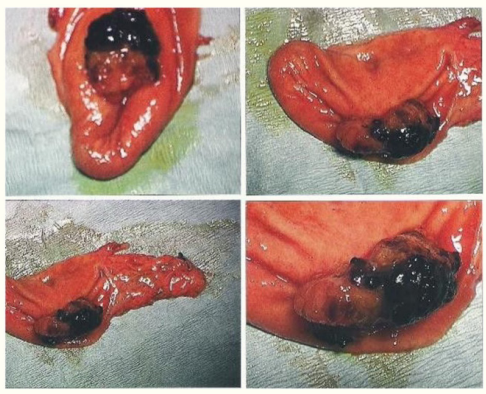


Cholesterosis

Note : Cholesterosis (Strawberry GB) is NOT a risk factor.

Clinical Features :

1. GB mass.
2. Jaundice (Late sign).



GB polyp

Management :

IOC : CECT (used for staging also)
↓
PET-CT (IOC for staging).

Stage	Feature	Rx
T1a	Above muscle layer	Simple cholecystectomy
T1b	Involves muscle layer	• Radical/Extended cholecystectomy • No chemotherapy
T2, T3		1. Radical cholecystectomy 2. Chemotherapy (Gemcitabine) f/b radiotherapy ±
T4	Invades adjacent structures	Gemcitabine chemotherapy ↓ Good response ↓ Surgery

Radical cholecystectomy
Structures removed : 1. GB. 2. Liver segments 4B & 5. 3. Lymph node along hepatoduodenal ligament. 4. CBD (If involved)

Extrahepatic Biliary Atresia (EHBA)

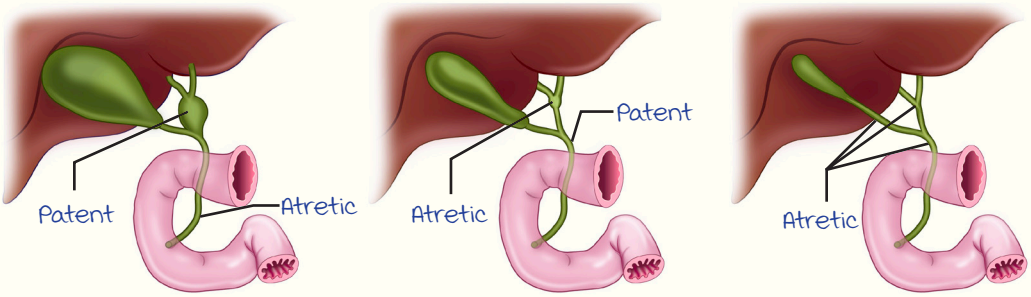
00:54:27 ----- Active space -----

Japanese & Anglo-Saxon classification :

Type I : Atresia restricted to CBD.

Type II : Atresia of CHD

Type III : Atresia of right, left hepatic ducts & entire extra hepatic biliary tree.



Associated Anomalies :

- Cardiac lesions.
- Polysplenia.
- Situs inversus.
- Absent vena cava.
- Pre duodenal portal vein.

Clinical Features :

Jaundice at birth. ⟶ D/d :

i. Neonatal hepatitis.

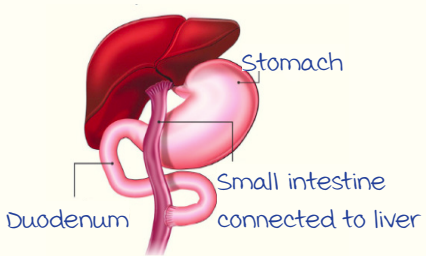
ii. Alagille syndrome : Biliary atresia, congenital heart disease, skeletal abnormalities.

Investigations :

1. Fasting USG (Gold standard) : Atretic biliary tree.
2. MRCP : Sensitive + Specific.
3. Liver Biopsy : Confirmatory.

Management :

1. EHBA : m/c indication for liver transplant in children.
2. Kasai procedure : Portoenterostomy.



Kasai's procedure

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Choledochal Cysts

00:57:31

Todani/Modified Alonso-Lej Classification :

Type	Description	Image	Rx
Type I (m/c)	Diffuse dilatation of the CBD		Cyst resection + Roux-en-Y hepaticojejunostomy
Type II	Diverticulum of CBD		Diverticulum resection & repair
Type III	Dilatation of intraduodenal portion of CBD (Choledochocele)		ERCP + Sphincterotomy + Removal of abnormal mucosa
Type IV A	Intrahepatic + Extrahepatic biliary tree dilatation		Liver transplant
Type IV B	Only extrahepatic biliary tree dilatation		Kasai procedure (Portoenterostomy)
Type V	Dilatation of only intrahepatic biliary tree (Caroli's disease)		Liver transplant

Features :

↑Risk of cholangiocarcinoma.

C/f : Lump, Jaundice, pain.

IOC : MRCP.

Pancreatic Malformations

00:59:58

Pancreas Divisum :

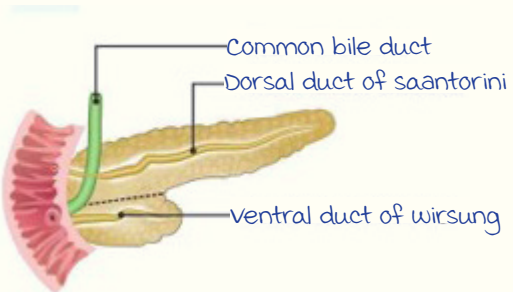
- m/c congenital anomaly of pancreas.
- Failure of fusion of dorsal & ventral ducts

↓

Ineffective drainage

↓

↑Risk of pancreatitis.



Mx : ERCP + Sphincterotomy.

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Annular Pancreas :

D/t failure of complete rotation of ventral pancreatic bud

↓

Forms circular tissure around 2nd part of duodemum

↓

Obstruction.

Features : Non-bilious vomiting (m/c) + Double bubble sign.

Mx : Duodeno-duodenostomy.

Acute Pancreatitis

01:01:47

Causes :

1. Gall stones (m/c).
2. Alcohol (2nd m/c).
3. Trauma (m/c cause in children).
4. Drug induced (ART/Chemotherapy/ Thiazides).
5. Hyperparathyroidism.
6. Scorpion bite.

Pathophysiology :

Theory of co-localisation : Activation of pancreatic enzymes within pancreas

↓

Autodigestion

↓

Inflammation.

Cullen's sign

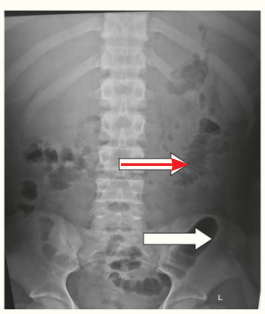
Clinical Features :

1. Epigastric pain :
   - Radiates to the back.
   - Relieved by bending forward.
2. Acute hemorrhagic pancreatitis :
   - Cullen's sign : Discolouration around umbilicus.
   - Grey turner sign : Discolouration in flanks.

Grey Turner sign

Investigations :

1. Lab Ix : S. Amylase (Sensitive) & S. lipase (Specific, late).
2. X-ray :
   a. Colon cutoff sign.
   b. Sentinel loop sign.
   c. Gasless abdomen.
3. CECT : IOC.



Sentinel loop sign

Colon cutoff sign

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Scoring for Acute Pancreatitis :

Severe pancreatitis :

1. Glasgow criteria ≥3.
2. BISAP score ≥3.
3. Ransons criteria ≥3.
4. CT severity index/Balthazar grading ≥6 : Best scoring system.

Ranson's criteria	
On admission : • WBC >16,000/μL. • Age >55 years. • Glucose >200 mg/dL. • AST >250 IU/L. • LDH >350 IU/L.	Within 48 hours of admission : • Hct decrease >10%. • BUN increase >5 mg/dL. • Serum calcium <8 mg/dL. • Arterial pO_a <60 mmHg. • Base deficit >4 mEq/L. • Fluid needs >6 L.

CT Criteria for Pancreatitis :

Acute peripancreatic collection	Acute necrotic collection	Walled-off necrosis	Pseudocyst
<4 weeks	<4 weeks	>4 weeks	>4 weeks
Homogenous	Heterogenous	Heterogenous	Homogenous
No fully definable wall	No fully definable wall	Well defined wall	Well defined wall
Mx : Pigtail catheter.			-

Local Complications of Acute Pancreatitis :

1. Pseudocyst.
2. Pseudoaneurysm (In splenic artery).
3. Splenic vein thrombosis ⟶ Portal HTN.
4. Pleural effusion (Left-side).

Pseudocyst

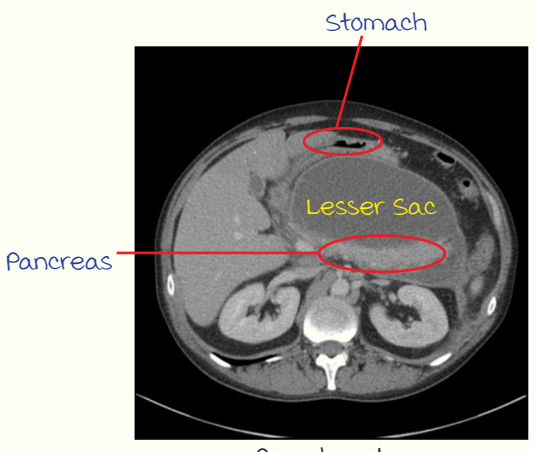
01:07:47

Features :

- False cyst : Lined by granulation tissue.
- m/c site : Lesser sac.

C/f : Epigastric mass, nausea & vomiting, ↓appetite.

IOC : CECT.



Pseudocyst

d'Egidio's Classification :

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Cyst type	Pancreatitis	Cystoductal communication
Type I	Acute pancreatitis	⊖
Type II	Acute on chronic pancreatitis	⊕/⊖
Type III	Chronic pancreatitis	⊕

Management :

- Mostly resolves spontaneously.
- Indications for intervention →
  - >6cm size.
  - >6 weeks old.
  - >6mm thickness of wall.

Intervention :

1. External drainage :
   - For infected cyst.
   - C/I : Communication with pancreatic duct (D/t risk of fistula formation).
2. Internal drainage :
   - Cystogastrostomy.
   - Cystojejunostomy.

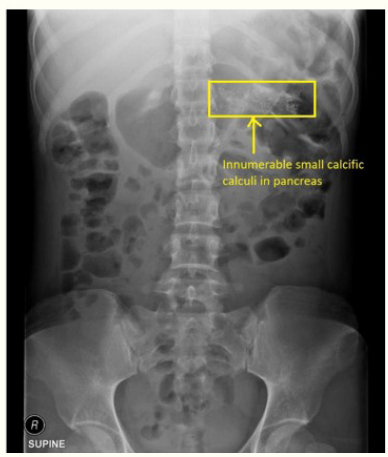
Chronic Pancreatitis

01:10:09

Causes :

TIGAR-O classification.

- Toxins : Alcohol (M/C), dietary.
- Idiopathic.
- Genetic/Hereditary :
  - PRSS 1 mutation : Hereditary pancreatitis.
  - SPINK 1 mutation : Tropical calcific pancreatitis (D/t cassava consumption, ↑risk of Ca).
- Autoimmune (IgG4).
- Recurrent (D/t stones).
- Obstruction.



Tropic calcific pancreatitis

Clinical Features :

1. Malabsorption & steatorrhea : D/t exocrine insufficiency.
2. DM : D/t endocrine insufficiency (↓Insulin).
3. Pain : Stones in main pancreatic duct (MPD) → Ineffective drainage.

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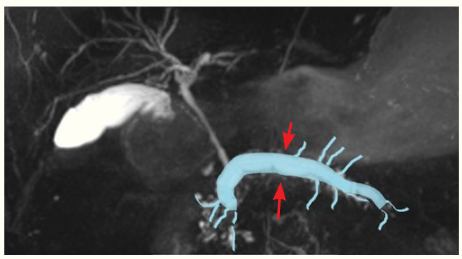
Management :

- Exogenous enzymes, OHAs.
- Analgesics for pain



Chain of lakes appearance
(D/t stones in the MPD)

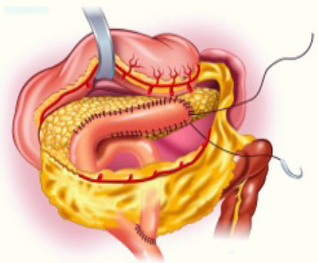
- Good response → Continue.
- No response → Intervention

Drainage (Based on MPD diameter) :

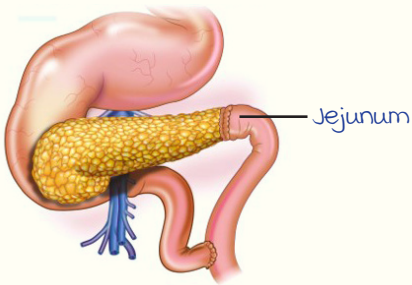
1. <5 mm : ERCP + sphincterotomy.
2. >5 mm : Pancreaticojejunostomy.
   a. Puestow's : Longitudinal anastomosis.
   b. Duval's : End to End anatomosis.

Resection :

1. Inflammation restricted to tail : Distal pancreatectomy.
2. Restricted to head & neck : Beger's procedure.



Puestow's procedure



Duval's procedure

Endocrine Tumours of Pancreas

01:14:18

INSULINOMA

- m/c pancreatic endocrine tumour.
- 90% Benign.
- Tumour of β-cells.
  - Equally distributed in pancreas.

Whipple's triad
• Fasting hypoglycemia symptoms. • Blood sugar <40mg/dl. • Rapid resolution on giving glucose.

Management :

Investigations :

1. Fasting insulin : ↑.
2. C-peptide : ↑.
3. 72 hour fasting test (Gold standard).
4. Endoscopic USG (EUS) : Best to localize.

Rx : Enucleation.

----- Active space -----

GASTRINOMA

- Tumour of G cells (Gastrin producing) → Zollinger Ellison Syndrome (±).
- m/c pancreatic tumour in MEN I Syndrome.
- Malignant : 70%.

Clinical Features :

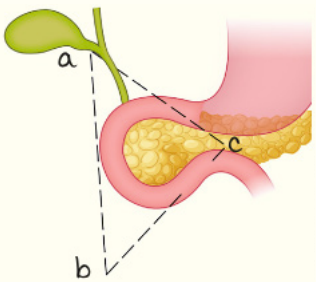
1. Recurrent ulcers.
2. Ulcers at atypical locations.
3. Diarrhea, malabsorption.

Investigations :

1. S. gastrin >1000 pg/ml : Diagnostic.
2. S. gastrin <1000 pg/ml → Secretin/pentagastrin stimulation test
   ↓
   ↑s. Gastrin by >200 pg/mL → Gastrinoma ⊕.
3. EUS : For localisation.

Passaro's Triangle :

Boundaries	Contents
1. CHD & Cystic duct junction. 2. D_a–D_3 junction. 3. Junction of head & neck with body of pancreas.	1. 1st part of duodenum (DI). 2. Head of pancreas. 3. Lymph nodes.



Gastrinoma triangle/
Passaro's triangle

Significance :

- m/c site for gastrinoma : Wall of DI.
- Gastrinomas outside Passaro's triangle : More aggressive.

Management :

1. Surgery.
2. Chemotherapy : If malignant.

GLUCAGONOMA

Clinical features : 4 Ds

1. DM.
2. Dermatitis.
3. DVT.
4. Depression.

Necrolytic migratory rash

----- Active space -----

Pancreatic Ductal Adenocarcinoma

01:18:26

m/c exocrine tumour of pancreas.

Risk Factors :

- Smoking.
- Obesity.
- DM.
- African American.
- Alcohol.
- Hereditary pancreatitis : PRSS gene.
- Tropical calcific pancreatitis : SPINK 1 gene.
- Chronic pancreatitis.
- Syndromes : Peutz Jeghers syndrome (>100 times risk).

Genetic mutations : KRAS (1st & m/c) → CDKN2A → SMAD4 → P53(Last).

Clinical Features :

Presents with periampullary cancers.

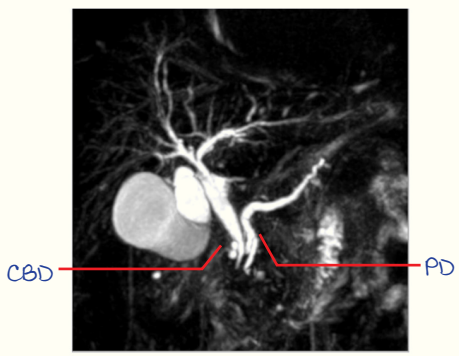
Common C/f : Obstructive jaundice with palpable GB (Courvoisier's law).

Types :

1. Head of pancreas (m/c).
2. Ampullary variety : Waxing & waning of jaundice + Melena.
3. Distal CBD cholangiocarcinoma.
4. Duodenal adenocarcinoma.

Investigations :

1. CECT : IOC.
2. MRCP : Double duct sign.
3. Duodenography : Frostberg reverse 3 sign.
4. PET-CT : IOC for staging.
5. Ca 19-9 : Tumour marker.



Double duct sign

Treatment :

1. Resectable tumour : Head of pancreas → Whipple's surgery (Pancreatic duodenectomy).
2. Chemotherapy :
   - Gemcitabine + Capecitabine.
   - mFOLFIRINOX : Better results.

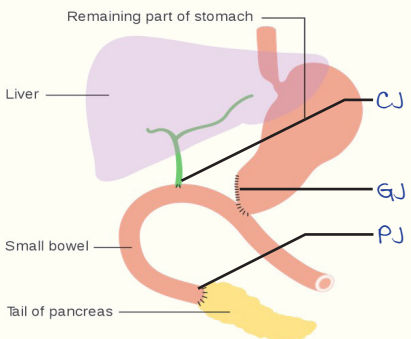
----- Active space -----

Whipple's surgery :

Incision : Rooftop/Chevron incision.

Pylorus preserving Whipple's : ↓Chances of dumping syndrome

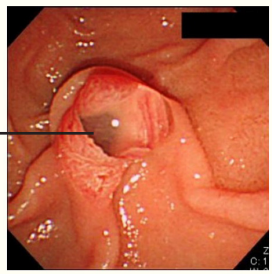
Structures removed	3 Anastomoses	Complications
• CBD • GB • Head of pancreas	1. Gastrojejunostomy. (GJ) 2. Pancreaticojejunostomy (PJ) 3. Choledochojejunostomy (CJ)	1. Altered gastric emptying (m/c) 2. Hemorrhage. 3. Pancreatic fistula. 4. Wound infection. 5. Anastomotic leak : – m/c cause of death. – m/c site : PJ.



Whipple's anastomoses

Intraductal Papillary Mucinous Neoplasm (IPMN)

Ohashi's triad :
Fish mouth appearance
+ Mucin from ampulla
+ Dilated main pancreatic duct.



ERCP

Laparoscopy

01:23:53

Minimally invasive surgery.

Pneumoperitoneum :

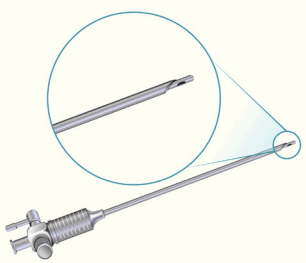
- Gas : CO_2 (Non combustible)
- Pressure : 10–14 mmHg.

Physiological Effects :

1. Sinus Bradycardia :
   - Due to peritoneal stretching ⟶ Vagal stimulation.
   - m/c arrythmia in laparoscopy.
2. Reflex tachycardia & ↓CO, ↓SBP : D/t IVC compression.
3. ↑Airway resistance & PEEP : As diaphragm is pushed up ⟶ ↓Thoracic volume.
4. ↓Urine output : D/t compression of renal artery.
5. ↑Intracranial pressure.

Instruments :

1. Veress needle :
   - Used in closed method to create pneumoperitoneum.
   - Has bevelled edge.



Veress Needle

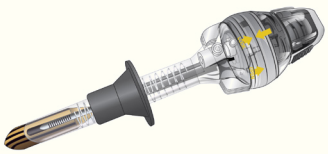
----- Active space -----

2. Sharp trocar :
   - Inserted after Veress needle.
   - Used to insert other instruments.
   - If bowel injury : Keep in place & convert to open procedure.

Trocar

3. Hasson's Cannula :

For open method (Hasson's)



4. Optiport/Visiport :
   - Transparent end
   - Can hold camera
   - Clear ends

   } Prevents bowel injury.

5. Laparoscopic instruments :

- Has insulation (Black coating).
- If insulation breaks ⟶ Capacitance coupling ⟶ Bowel injury (Burns).
  (Prevention : Plastic trocar)

Other Minimally Invasive Procedures :

1. SILS :
   - Single incision Laparoscopic surgery
   - multiple instruments can be inserted from a single post.

SILS port

2. Robotic surgery : Da Vinci system
   - Advantages :
     i. Finer dissection.
     ii. Better movement (7 degrees of freedom).
     iii. Tremor reduction.
   - Disadvantages :
     i. Expensive.
     ii. Loss of tactile feedback.
3. NOTES : Natural Orifice Transluminal Endoscopic Surgery
   - Eg : POEM, TATME, TOGA.
   - No scar over abdomen.

UROLOGY : PART 1

----- Active space -----

Kidney Disorders

00:01:01

Duplication Of Ureteric System :

Wiegert meyer rule :

- Ureter draining upper pole —Inserted→ Ectopic site : Infero-medial to normal.
- Ureter draining middle + lower pole → Normal.

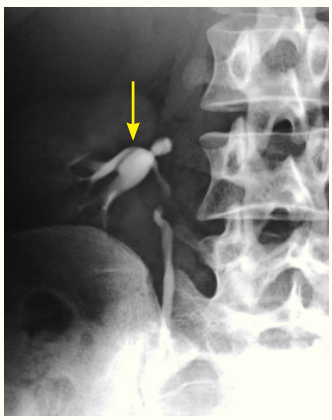
Ectopic sites :

- M → Urethra.
- F → Vagina (C/f : Urinary dribbling).

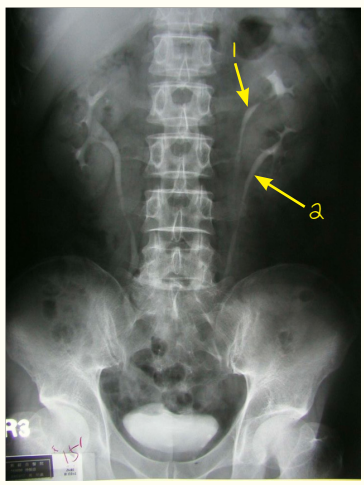
Ix : Intravenous Urogram (IVU)

- Dye : Urograffin.
- Drooping lily sign :
  Duplication + malrotation of pelvis.

Mx : Re-implantation of ureter.



IVU : Drooping lily sign



IVU : Duplicated ureter

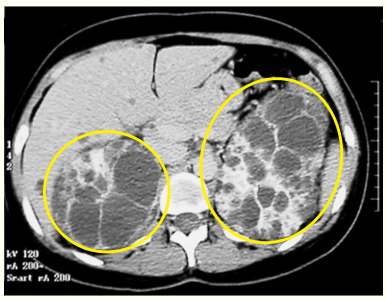
Polycystic Kidney Disease (PCKD) :

Types :

Infantile PCKD	Adult PCKD
Autosomal recessive.	Autosomal dominant.
PKHD on Chr 6.	PKD 1 on Chr 16/PKD 2 on Chr 4.
Not compatible with life.	Compatible with life.
Death due to hepatic fibrosis.	• Hypertension : 3rd decade of life (m/c feature). • Abdominal mass, hematuria, multiple cysts. • Cysts ↑ size → Symptomatic ⊕

Extrarenal manifestations :

1. Liver cysts (m/c).
2. Cysts in spleen, pancreas or lungs.
3. Colonic diverticulosis.
4. Mitral valve prolapse.
5. Berry aneurysms in circle of willis.
   ↓ Rupture
   Subarachanoid haemorrhage (SAH)



Polycystic Kidney

----- Active space -----

Ix : USG, can be detected on prenatal USG.

Mx :

- Transplant.
- Dialysis.

Note : No role of cyst deroofing Sx.

Horseshoe Kidney :

- Lower poles (Both kidneys) fused at L3-L4 level → Ascent restricted by : Inferior mesenteric artery.
- Adrenal glands : Normal position. (D/t separate embryogenesis).
- IVU : Flower vase/hand shake sign.


Horseshoe Kidney

Mx :

- Pyeloplasty (If hydronephrosis/malrotated pelvis).
- Do not cut fused portion (Risk of devascularization).

Hydronephrosis :

Intermittent partial/complete blockade of urine flow
↓
Aseptic dilatation of pelvi-calyceal system.

Unilateral hydronephrosis :

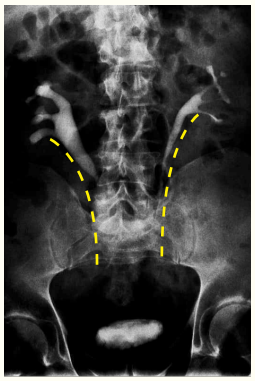
Causes :

Intraluminal	Intramural	Extraluminal
1. Stone disease : m/c cause of acquired hydronephrosis.	1. PUJ obstruction : • m/c cause of congenital hydronephrosis. • Adynamic obstruction. • IVU : Clubbing of calyces (+) • Sx : Anderson Hynes Pyeloplasty	1. Aberrant renal vessel : • Usually U/L; never cut it. • Mx : Pyeloplasty.
		2. Advanced cancers : Colorectal, cervical, prostate.
2. Sloughed papillae	2. Ureterocele : • IVU : Cobra head/Adder head sign (+) (Ureteric terminal ends dilated). • Sx : Ureter re-implantation.	3. Retroperitoneal fibrosis (Ormond's disease) : • Maiden waist deformity (medial indrawing of ureters). • Causes : – Idiopathic. – Post radiotherapy. – Drug induced : Methysergide. • Mx : DJ Stenting.
	3. Transitional cell carcinoma pelvis/ureter : Goblet sign on IVU.	4. Retrocaval ureter : • Right ureter goes behind IVC. • Reversed J/Fish hook sign.

----- Active space -----


Goblet sign


Cobra head sign

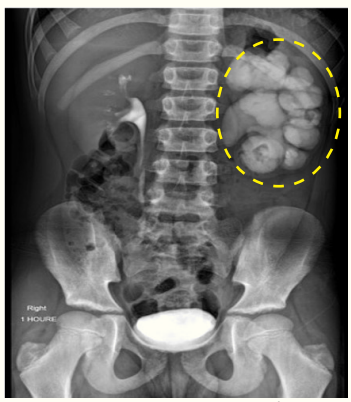

Maiden waist deformity


Fish hook/ Reverse-J sign

Bilateral hydronephrosis :

Causes :

- Any U/L cause of both sides.
- BPH.
- Bladder outlet obstruction. (Eg : Urethral stricture)
- Posterior urethral valves.
- Phimosis.
- Meatal stenosis.


IVU (PUJ obstruction) : Clubbing of calyces

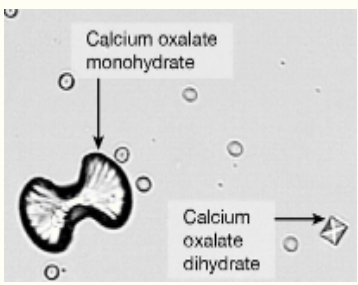
Ix :

- IVU : Clubbing of calyces (+)
- Renal isotope scans
  - Detect scarring : Technetium-99m Dimercapto Succinic acid (DMSA) scan
  - Detect kidney function
    - Diethylene triamine pentaacetate (DTPA) scan
    - Best : mercaptoacetyl triglycine (MAG3) scan

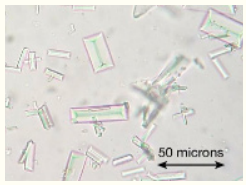
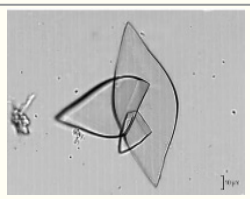
Renal Stones

00:12:40

Types :

Stones	Features	Image
Calcium oxalate	• m/c type, radio-opaque. • Formed in acidic urine. • Types : 1. Monohydrate : – Dumb-bell shaped. – Very hard. 2. Dihydrate : – Envelope shaped. – Spiculated margins (Mulberry stones) : Present early (Pain + hematuria).	

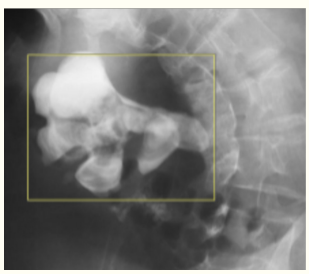
----- Active space -----

Stones	Features	
Triple phosphate/ Struvite/Staghorn (Calcium ammonium mg PO_4)	• Proteus urine infection. • Radio-opaque. • Coffin lid shaped. • Urine : Alkaline. • Smooth surface, large size.	
Cystine stones	• Radio-opaque. • Very hard : Crystaline lattice. • Hexagonal. • Difficult to break by ESWL. • Seen in cystinuria. • Mx of recurrent stones : d-Penicillamine.	
Uric acid	• m/c radiolucent stones. • Crystals : Glass shreds. • Seen in : – Tumour lysis Syndrome. – Gout.	

Rare stones :

- Xanthine
- Triamterene
- Indinavir stone (On anti-retroviral Rx)

} Radiolucent



Staghorn calculus

Presentation :

- Pain (m/c)

Fixed renal pain. (At renal angle)

Colicky pain (Based on stone site)

- Pelvis : Radiating from loin → groin.
- Upper & mid ureter : Iliohypogastric nerve.
- Lower ureter : Ilioinguinal nerve.
- Impacted intramural portion : Strangury (Intense pain or urge to pass urine → Few drops of bloody urine (+))

- Hematuria
- Hydronephrosis.
- Dietl's crisis :

Stone blocks urine flow → Pain + palpable mass (Dilated Kidney) → Stone shifts → Large quantities of diluted urine

Mx :

Dietary advise (Recurrent calcium oxalate stones) :

- ↓Fat content.
- ↑Calcium intake.
- ↑Pyridoxine dose.
- Cholestyramine (Binds oxalate in gut → ↓Incidence).

Ix :

NCCT (IOC).

----- Active space -----

Based on stone size
- < 5mm : No active intervention.
- 5-6 mm, symptomatic : medical mx (1st line) → Fails → ESWL.
- > 2cm : PCNL.

medical mx : Tamsulosin (α blocker) → Relaxes distal ureteric muscle.

Fails

Extracorporeal shock wave lithotripsy (ESWL) :

- Principle : Ultrasonic waves → Fragments stone → Passed in urine.
- Complications :
  - Pain (m/c).
  - Hematuria
  - Stone street/Steinstrasse → ureter, clogged with stone fragments
  - UTI

Contraindications	
• Pregnancy • Uncontrolled bleeding disorder • Cardiac Pacemaker • Stone size > 1.5 cm • Children	• Obese • Very hard stones (Cysteine > Calcium oxalate monohydrate) • Obstructed system • Lower calyx Stone

Fails or C/I → PCNL / RIRS/URS

Percutaneous nephrolithotomy (PCNL) :

- Indications
  - Stones >2cm.
  - Lower pole stone with anatomy unfavourable for SWL.
  - Failed ESWL/RIRS for renal calculi.
  - Staghorn calculi.
- Mini PCNL : Children; <22 F tracks used.

PCNL

Retrograde intra renal surgery (RIRS) :

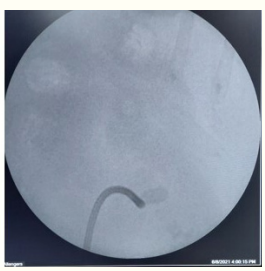
Indications :

a. Stones <2 cm.

b. Lower pole.

c. Obesity

d. Musculoskeletal deformities.



RIRS

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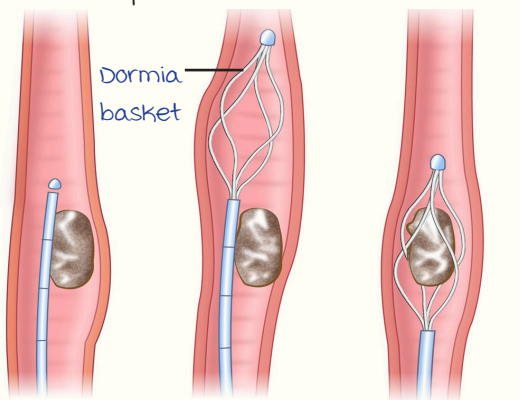
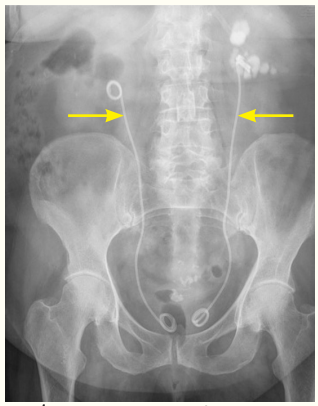
Ureteroscopic removal of stones (URS) :



Basket introduced past stone → Opened → Stone enclosed, ready for withdrawal



B/L Double J (DJ) stents :

- Inserted by cystourethroscope.
- Facilitates passage of stone fragments.

Bladder Stones & VUR

00:22:39

Bladder Stones :

m/c : Children.

m/c stones : Mixed urate.

Mx :

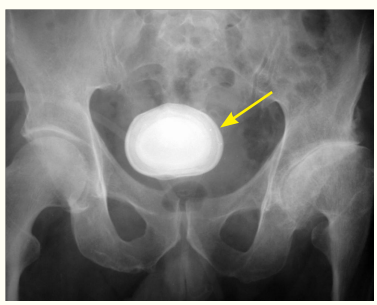
1st line : Perurethral cystolithotomy.

If C/I d/t :

- Urethral stricture.
- Bladder diverticulae.

↓

Suprapubic cystolithotomy



Bladder stone

Vesicoureteric reflux :

Grades :

Grade 1 : Reflux into non dilated ureter.

Grade 2 : Reflux into pelvis but no distension.

Grade 3 : Reflux with mild distension.

Grade 4 : Blunting of calyces/tortuous ureter.

Grade 5 : Severe distension of ureter along with loss of papillary impressions.

Ix : Micturating cystourethrogram (MCU).

MCU : VUR

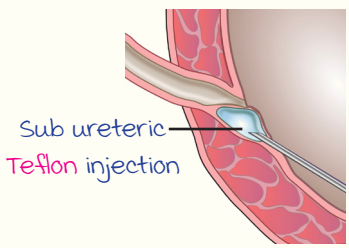
Rx :

- Grade 1, 2, 3 : Prophylactic antibiotics. (D/t recurrent UTIs)
- Grade 4, 5 : Prophylactic antibiotics

↓ Do not recover

STING procedure.

(Prevent urinary reflux)



STING procedure

Renal Infections

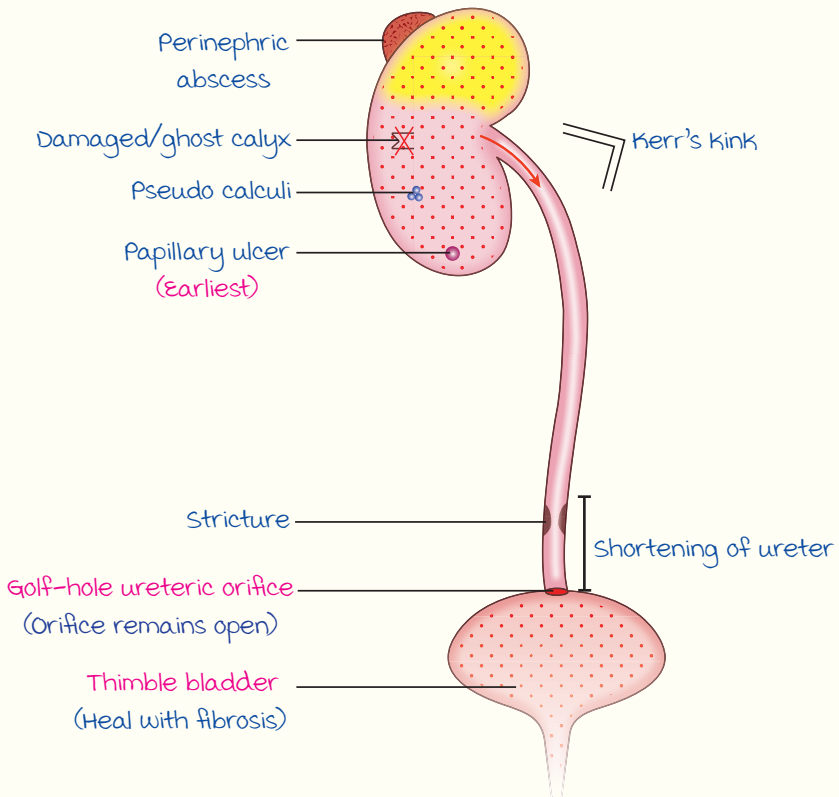
00:25:35 ----- Active space -----

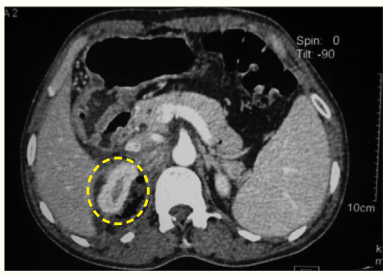
RENAL TUBERCULOSIS

2° infection d/t hematogenous spread.

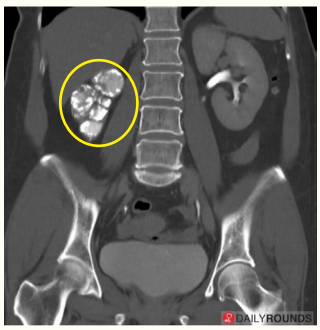
Presentations :

Ulcers → Caseous necrosis → Calcification (Putty/cement Kidney)

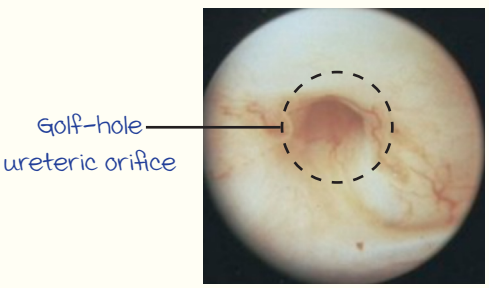




Perinephric abscess



Putty kidney



Urethroscopy

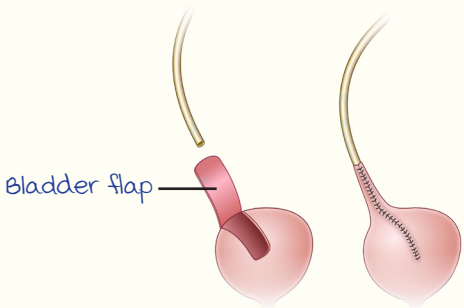
Clinical features : Hematuria, pain, mass, weight loss.

Ix :

- Urine examination : Sterile pyuria (Pus cells ⊕, culture ⊖).
- Confirmatory : Centrifuge 3 morning urine samples → ZN Staining.

Rx :

1. Medical Mx : Anti-tubercular treatment (ATT).
2. Sx :
   - Perinephric abscess : Drainage.
   - Ureteric kinking : DJ stenting.
   - Golf hole ureteric orifice : Ureteric re-implantation.
   - Thimble bladder : Augmentation cystoplasty.
   - Lower part of ureter : Boari flap repair for lower part of ureter.

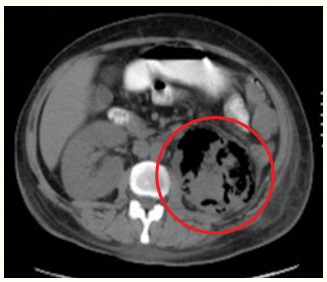
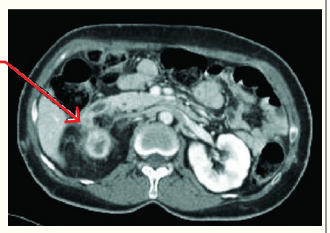


Boari flap repair

----- Active space -----

PYELONEPHRITIS

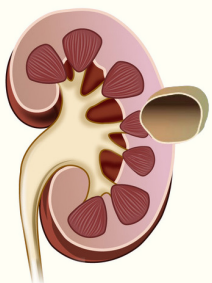
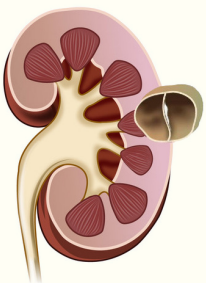
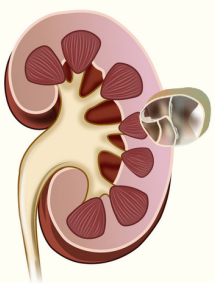
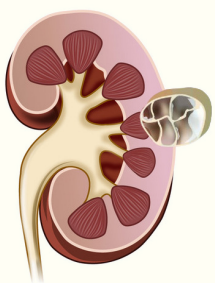
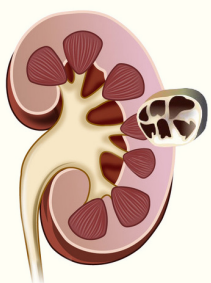
Types :

	Emphysematous pyelonephritis	Xanthogranulomatous pyelonephritis
Causative organism	E.coli	Proteus
Commonly seen	In immunocompromised, DM.	Middle aged females, in DM.
Symptoms	Fever, pain	Flank pain, pyrexia and abdominal mass.
IOC : CECT	Gas in and around kidney 	Non-functioning kidney, calculi, low density masses  Low density masses + Stones
Mx	Antibiotics + drainage ↓ Fails Nephrectomy.	Subcapsular nephrectomy

Renal Tumours

00:32:24

BOSNIAK CLASSIFICATION FOR RENAL CYSTS

					
Class	I	2	2F	3	4
Description	Simple cyst	Minimally complex	Minimally complex (Need follow up)	Indeterminate	Clearly malignant
work up	Nil		USG/CT Follow up	Partial nephrectomy	Partial/Total nephrectomy
% risk of malignancy	0 %		5%	50%	100%

BENIGN RENAL TUMOURS

Angiomyolipoma :

Benign tumour : 5-6th decade of life.

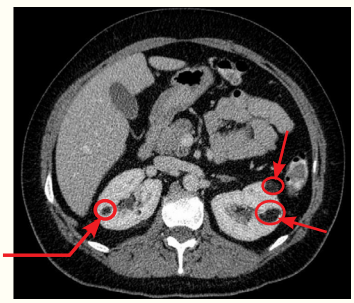
Origin : Perivascular epitheloid cells (EPC).

C/f :

- Asymptomatic (Usually).
- Wunderlich syndrome :
  - Massive retroperitoneal hemorrhage.
  - Lenk's triad.

Lenk's triad
• Mass • Hypotension • Flank pain

----- Active space -----



CECT : Angiomyolipoma (Bosniak : 3)

Ix : CECT (IOC).

Mx :

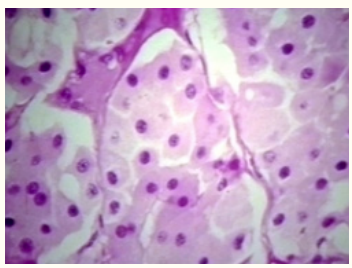
- <4cm + asymptomatic : Observation.
- >4cm + symptomatic : Partial nephrectomy or nephron sparing Sx.
- Bleeding (+) : Angioembolisation $\xrightarrow{F/b}$ Partial nephrectomy.

Oncocytoma :

m/c benign tumour of kidney.

HPE :

- Eosinophilic cytoplasm → Cell rich in mitochondria.
  (Plant like cell, raisin like nucleus)
- Tan brown appearance.
- Cytokeratin (−) (Differentiates from chromophobe RCC).

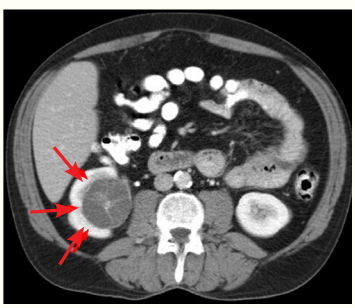

HPE : Oncocytoma

Etiology : Sporadic > Familial (Common in Birt Hogg Dube Syndrome).

C/f : Asymptomatic (Usually).

Ix : CECT (IOC) → Central stellate scar.

Mx → <4cm : Observation.
→ >4cm : Partial nephrectomy.


CECT : Central stellate scar

Note :

Birt Hogg Dube Syndrome : Oncocytomas, Chromophobe RCC, Fibrofolliculomas and Trichodiscomas.

MALIGNANT RENAL TUMOURS

Renal cell carcinoma (RCC) :

Risk factors :

1. DM
2. Hypertension.
3. Tobacco intake.
4. ↑Protein intake.
5. Thorotrast exposure.

Types of RCC :

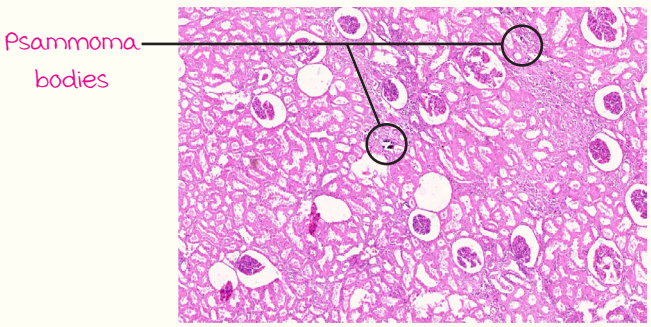
	Clear cell RCC	Papillary RCC	Chromophobe RCC
Genetics	3p & 6p deletion	CMET mutation	Loss of multiple chromosomes (1, 2, 6, 10, 13)
Associated conditions	Von-Hippel-Lindau syndrome	Hereditary papillary RCC syndrome	Birt Hogg Dube syndrome

----- Active space -----

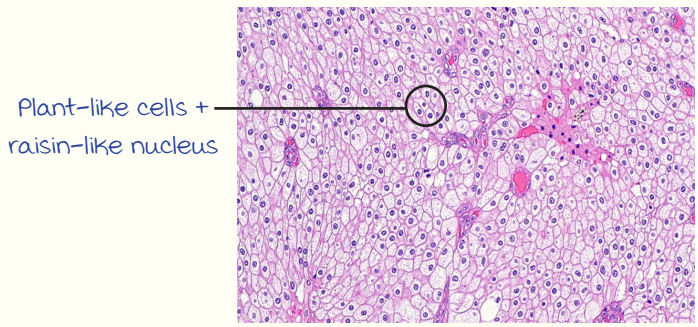
	Clear cell RCC	Papillary RCC	Chromophobe
Arises from	Proximal convoluted tubule (PCT)	PCT > Distal convoluted tubule (DCT)	-
HPE	Clear cells	Psammoma bodies • Seen : Long term dialysis. • Foci of dystrophic calcification.	Plant-like cells and raisin-like nucleus.
Other features	m/c type	-	• Best prognosis. • Cytokeratin ⊕.

Note :

- Collecting duct RCC has worst prognosis.
- Medullary RCC : A/w sickle cell anemia.



Papillary RCC



Chromophobe RCC

C/f :

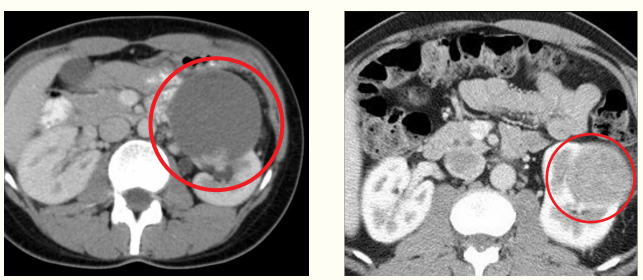
- Hematuria (m/c presentation) + pain + mass : Symptom triad.
- Paraneoplastic syndrome : ↑ESR (m/c).

Endocrine	Nonendocrine
• Hypercalcemia. • Hypertension. • Polycythemia. • Nonmetastatic hepatic dysfunction : Stauffer syndrome. • Galactorrhea. • Cushing's syndrome.	• Amyloidosis. • Anemia. • Vasculopathy. • Coagulopathy.

Note :

Stauffer Syndrome : IL-6 mediated, labs (↑s. bilirubin, ↑ALP) ⟶ Improves after Sx.

Ix : CECT (IOC).


CECT: Renal cell carcinoma
(Restricted to upper/lower pole of kidney)

Staging of RCC :

----- Active space -----

Stage	Definition	Subdivision
Tumor stage		
T0	No evidence of primary tumor	-
T1	<7 cm in greatest dimension, confined to the kidney	1a : <4 cm. 1b : >4 cm and <7 cm
T2	>7 cm in greatest dimension, confined to the kidney	2a : ≥7 cm and <10 cm 2b : >10 cm
T3	Extends into major veins or perinephric tissues but not into the ipsilateral adrenal gland or beyond Gerota fascia.	3a : Tumor extends into renal vein branches, or invades perirenal and/or renal sinus fat. 3b : Tumor extends into the subdiaphragmatic inferior vena cava. 3c : Tumor extends into the supradiaphragmatic inferior vena cava.
T4	Tumor invades beyond the Gerota fascia and/or contiguous extension into the ipsilateral adrenal gland.	-
Regional lymph nodes		
N0	No regional lymph node metastasis	
N1	Metastasis to regional lymph nodes	
Distant metastasis		
M0	No distant metastasis	

Mx :

1. Partial nephrectomy :

Indications	Relative indications
• T1 tumours (< 7 cm). • Restricted to poles. • B/L RCC. • RCC in solitary functioning kidney.	RCC in a kidney where other kidney is affected by : • Hydronephrosis. • Stones.

2. Radical nephrectomy :

Structures removed :

- Kidney
- Para-aortic lymph nodes.
- ± I/L adrenal gland.
- Gerota's fascia.
- Ureter till the brim.

3. Cryoablation of renal tumours :

Tumour freezing (-20 degrees) in →
- T1a RCC (<4cm).
- Elderly patients.
- Advanced/metastatic tumours.

----- Active space -----

Wilms Tumour :

- m/c paediatric renal malignancy.
- 2nd m/c abdominal malignancy in children.

Note : m/c abdominal malignancy in children is Neuroblastoma.

C/f :

- Mass : Does not cross midline (Help differentiate from Neuroblastoma).
- Hematuria.

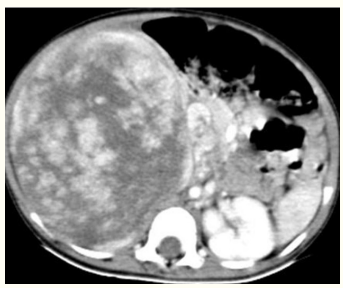
Etiology : Sporadic > Familial.

Familial syndromes with B/L wilm's tumour
• Beckwith Wiedemann syndrome. • Denys Drash Syndrome. • WAGR syndrome : – Wilm's tumor – Anirdia. – Genitourinary malformations. – Mental retardation.

IOC : CECT (Help differentiate from neuroblastoma).

National wilms tumour Staging (NTWS) :

Stage V : B/L wilms tumour.



CECT : Wilms tumour

Treatment Of RCC vs. Wilm's Tumour :

	RCC	Wilm's tumour
Chemo/Radio Rx	Resistant (Surgery : Only Rx of choice)	Sensitive (Used along with Sx)
Surgical principles	Same	
Prognostic factor	Pathological stage	Tumour histology

UROLOGY : PART 2

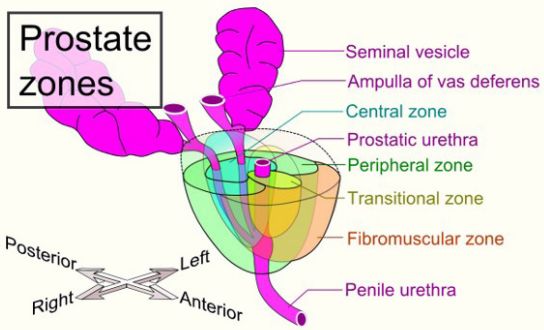
----- Active space -----

Prostate

00:00:37

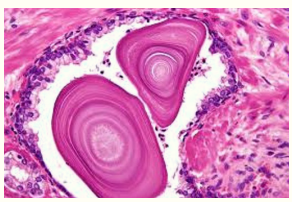
Zones of Prostate :

- Transitional zone : m/c involved in BPH.
- Peripheral zone : m/c involved in cancer.



Corpora Amylacea :

- Lamellated eosinophilic stones.
- Precursor for prostatic stones ($CaPO_4$).



Corpora amylacea

LOWER URINARY TRACT SYMPTOMS (LUTS)

Divided into voiding & storage symptoms.

Voiding	Storage
• Hesitancy. • Poor flow. • Intermittent stream. • Post-void dribbling. • Sensation of poor bladder emptying. • Episodes of near retention.	• Frequency (Earliest & m/c). • Nocturia. • Urgency. • Urge incontinence. • Nocturnal incontinence (Enuresis).

Workup :

1. Digital rectal examination (DRE) :
   - BPH : Rubbery, mobile mucosa.
   - Cancer : Hard, fixed mucosa.
2. USG KUB : Prostatic volume, upper urinary changes, residual urine.
3. Prostate specific antigen (PSA) :

Value (At 50 – 69 yrs)	Inference	Mx
0 – 3 ng/ml	Normal, BPH	• No biopsy needed. • BPH : Start Mx.
>3 – 4 ng/ml	BPH, cancer	Transrectal ultrasound (TRUS) guided biopsy : • Minimum 12 cores to be taken. • ↓LA. • Posterior lobe.
	Prostatitis	Antibiotics

----- Active space -----

4. Uroflowmetry :
   - >15 ml/sec : (N).
   - 10 – 15 ml/sec : Equivocal.
   - <10 ml/sec : Low flow.

Transperineal biopsy
• Done under GA. • Done for anterior lobe biopsy.

Benign Prostatic Hyperplasia (BPH)

00:05:13

Components :

- Dynamic : ↑Smooth muscle tone.
- Static : Stromal hyperplasia.

Management :

Medical Mx : α-blockers + 5α reductase inhibitors.

1. α-blockers : Tamsulosin.
   - Fast acting.
   - ↓Muscle tone (Action on dynamic component).
2. 5α reductase inhibitors :
   - Slower acting but sustained effect (In 6 months : 50% ↓ in PSA).
   - ↓Gland size (Action on static component).

Surgical Mx :

1. TURP (Transurethral resection of prostate).
2. TULIP (Transurethral laser incision of prostate).
3. Nd YAG (m/c).
4. KTPA (Best laser).

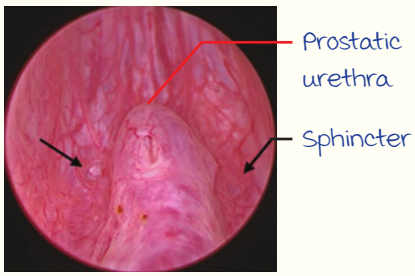
Indications for surgical Mx :

1. Hydronephrosis/upper urinary tract changes.
2. Recurrent UTI.
3. Urinary retention.
4. <15 ml/sec on uroflowmetry.
5. Complications : Hematuria, stones, bladder diverticulae.

TURP

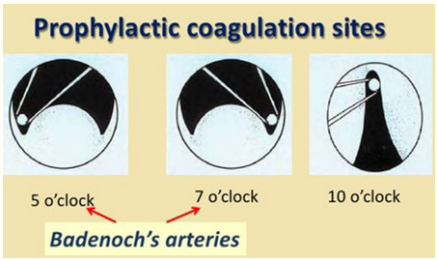
Irrigation fluid :

1. 5% dextrose.
2. Distilled water.
3. Isotonic glycine (m/c used).
4. Normal saline : Only with bipolar cautery.



Verumontanum
(Distal limit of resection)

Complications :



1. Retrograde ejaculation (m/c) :
   D/t bladder neck injury.
2. Hemorrhage : D/t Badenoch arteries.
3. Clot retention :
   Prevented by using 3-way Foley's catheter.
4. Incontinence : D/t resection beyond verumontanum → Bladder injury.
5. Water intoxication/dilutional hyponatremia/TURP syndrome :
   - m/c with distilled water/5% dextrose.
   - Isotonic glycine usage → ↓Incidence.
   - During Sx : Urethra $\xrightarrow{\text{Water diffusion}}$ Blood vessels → Hyponatremia.
   - Altered sensorium + Headache (Few hours post-op).
   - Management :
     - Mild (120 – 130 mEq/L) : Water restriction.
     - Severe (<120 mEq/L) : 3% hypertonic saline (≤8–10 mEq/L/day gradually).

Note : Rapid, >8–10 mEq/day correction → Central pontine demyelinosis.

Prostatic Cancer

00:12:04

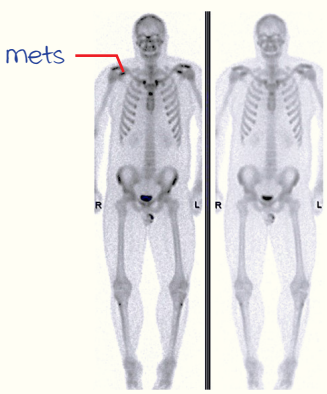
Risk Factors :

- Increasing age (m/c >5th decade).
- Increased testosterone.
- African American.
- BRCA 2 > BRCA 1.
- Obesity.

Indications for bone scan
1. PSA >10 ng/ml.
2. Gleason >7.
3. Symptomatic.

Spread :

- Local.
- Lymphatic (1st : Obturator LN).
- Distant mets : Bones (Lumbar vertebrae).
  - Osteoblastic > Osteolytic.
  - Travels via Batson's plexus.



Bone scan

Investigations :

IOC : TRUS guided biopsy.

Gleason's score :

- Based on m/c gland type + 2nd m/c gland type.
- Each type is graded (1 → Well differentiated to 5 → Poorly differentiated) & summed.

----- Active space -----

Risk group	ISUP grade group	Gleason score
Low	1	≤6
Intermediate (Favourable)	2	7 (3+4)
Intermediate (Unfavourable)	3	7 (4+3)
High	4	8
High	5	9–10

management :

T1, T2a

Radical prostatectomy	Observation/surveillance
Indications : • <70 yrs. • Life expectancy : >10 years. • G3, G4 tumours. Structures removed : • Prostate. • Iliac + obturator lymph nodes. • Seminal vesicles.	Indications : • >70 yrs. • Life expectancy : <10 years. • G1, G2 tumours.

T2b, T3, T4

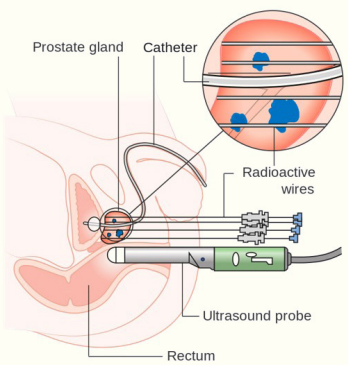
- <70 yrs.
- >10 years of life expectancy.
- G3, G4 tumours.

→ Brachytherapy (I^{125}, Pd^{103})

- No residual disease → Surveillance.
- Residual disease ⊕ → Radical prostatectomy.

- >70 yrs.
- <10 years of life expectancy.
- G1, G2 tumours.

→ Brachytherapy ± Androgen deprivation therapy (ADT).



Brachytherapy

metastasis → First line : ADT

- Surgical : B/L orchidectomy.
- Medical : LHRH agonists (Zoladex : Goserelin, buserelin) → Antiandrogens (Flutamide, abiraterone : Zytiga).

Hormone resistant disease :

- Chemotherapy : Cabazitaxel, paclitaxel.
- Radiotherapy.
- Sipuleucel-T : T-cell vaccine (Provenge).
- Hormone resistant bony mets : Radium 223 (α rays).

----- Active space -----

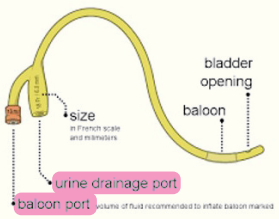
Foley's Catheter 00:19:07

French (Fr) : Outer circumference.

Colours :

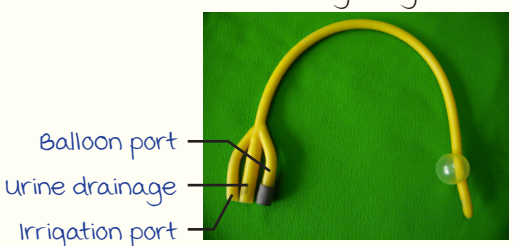
- White : 12 Fr.
- Green : 14 Fr.
- Orange : 16 Fr.
- Red : 18 Fr.

Normal Foley's :



2 channels

3-way Foley's :



- 3 channels.
- Used in clot retention.

Types of Foley's :

- Rubber Foley's : 25-30 days.
- Silicone Foley's : 90 days (3 months).

Note : Stuck foley's → USG guided suprapubic puncture.

Bladder Trauma 00:20:12

Extraperitoneal rupture	Intraperitoneal rupture
2° to pelvic fracture	2° to blunt/penetrating trauma to a full bladder
A/w deep perineal hematoma	A/w peritonitis, syncopal attack
IOC : CT urography	
Mx : Foley's/suprapubic catheter (SPC) x 7 days	Mx : Laparotomy + Bladder repair in 2 layers + Foley's/SPC

MCU

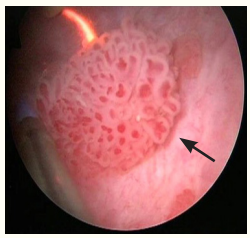
Bladder Cancer 00:21:39

Types :

1. Transitional cell carcinoma :
   - M/c overall.
   - Etiology (3Cs) :
     - Chemical.
     - Cyclophosphamide.
     - Cigarettes.
2. Squamous cell carcinoma :
   - M/c in Africa.
   - Etiology (2S) :
     - Smoking.
     - Schistosomiasis.

----- Active space -----

3. Adenocarcinoma :
   - Rare.
   - Develops at persistent urachus.


Cystoscopy

Clinical Features :

Gross painless hematuria.

Investigations :

1. USG KUB : Shows clots/growth inside bladder.
2. Urine cytology : To look for malignant cells in urine.
3. Cystoscopic biopsy (IOC) : TURBT f/b HPE.
4. MRI : For staging.

TNM Staging :

Ta : Non invasive papillary carcinoma
Tis : Carcinoma in situ
T1 : Above muscle layer
} Superficial.

Management :

TURBT (Trans urethral Resection of Bladder Tumor)

- Muscle invasive
  - T2 : Surgery
  - T3, T4 : Chemo → Surgery
- Non muscle invasive
  - Ta → Observation/single dose of intravesical mitomycin C (Chemotherapy)
  - Tis → Intravesical BCG (Immunotherapy) x 6 cycles
  - T1 → Intravesical chemotherapy/BCG

- Check cystoscopy every 3 months : To look for recurrence.
- Nuclear matrix protein (NMP) : Urinary marker.

Surgery

- Radical cystectomy
  - Removal of : Bladder + Iliac LN + Obturator LN + (In females : Urethra + TAH) + Urinary diversion
    - Continent → Neobladder (Ileum)
    - Non continent
      1. Ureterosigmoid anastomosis. → Obsolete d/t :
         - ↑Risk of cancer
         - Recurrent UTI
         - Hyperchloremic hypokalemic metabolic acidosis
      2. Ileal conduit (m/c used) : Ureters → Ileostomy.
- Partial cystectomy
  - For small tumor restricted to domes & not involving the ureteric orifice

Urethra

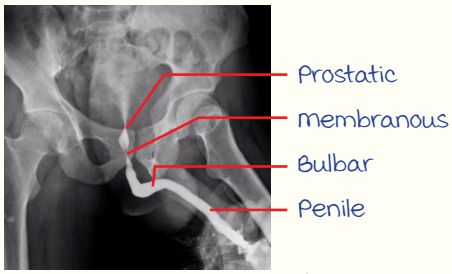
00:27:42 ----- Active space -----

Length :

- Female : 3–4 cm.
- Male : 18–21 cm.

Parts :

- Proximal : Membranous + prostatic urethra.
- Distal : Penile + bulbar urethra.



Retrograde urethrogram (RGU)

Hypospadias

00:28:46

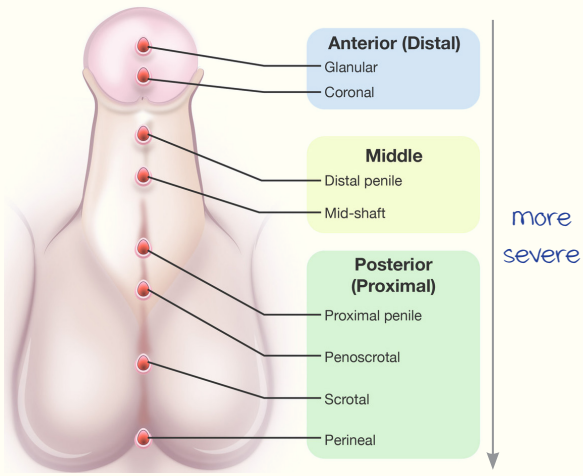
Features :

- m/c congenital urogenital anomaly.
- Ventrally placed urethral opening.
- A/w micropenis & undescended testis.
- m/c & most mild type : Glanular.
- Most severe : Perineal.

Clinical Features :

- Downward directed urine stream.
- Downward bending of penis (Chordee).
- Infertility.
- O/E :
  - Urethral opening in lower aspect.
  - Hooded prepuce.

Types :



Management :

Steps of Sx :

Orthoplasty (Chordee correction) → Urethroplasty (Placement of urethral opening at normal position) → Glanuloplasty → Skin cover.


Hypospadias

Surgeries :

1. Single stage procedures :
   - Distal hypospadias : Mustardee, Mathieu.
   - Mid hypospadias : Snodgrass, TIP.
2. Double staged procedure : Proximal hypospadias.
   - → Thiersch duplay, Dennis brown.

Note : Circumcision is contraindicated as foreskin is used for reconstruction.

----- Active space -----

Ectopia Vesica

00:31:47

- AKA bladder extrophy.
- Anterior abdominal wall & anterior wall of bladder is deficient below umbilicus.

Clinical features :

- Urine dribbling from bladder.
- Undescended testis.
- Bifid clitoris.
- Pubic diastasis.

Urethral Trauma

00:32:26

Types :

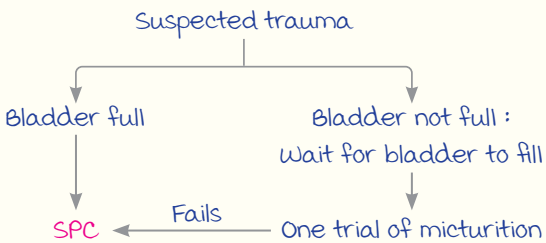
	Anterior urethral injury	Posterior urethral injury
Injured part	Penile/bulbar urethra	membranous/prostatic urethra
Mode of injury	Direct trauma/straddle injury	Secondary to pelvis fracture
Features	Superficial perineal hematoma around penis/scrotum	• Deep perineal hematoma • Vermooten sign → Floating prostate
	• Blood at tip of meatus • Inability to pass urine	

management :

IOC : RGU.

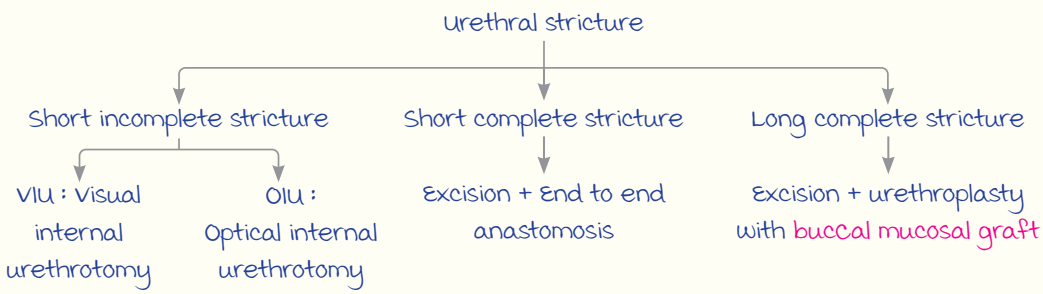
Treatment :

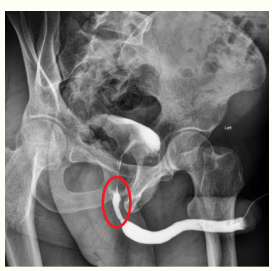
RGU : membranous urethral injury



Note : Do not pass Foley's.

Complications :





Urethral stricture

----- Active space -----

Fracture Shaft of Penis :

Clinical features :

- Tear in the corpora cavernosa of penis.
- Usually seen in erect penis (During sexual activity).
- Popping sound f/b pain.
- Eggplant deformity of penis.

Mx : Hematoma evacuation & penile repair.

Eggplant deformity

Posterior Urethral Valve 00:36:03

Young's classification :

Type I (m/c) : Anteroinferior to verumontanum.

Type 2
Type 3 (Cobb's collar) } Rare.

Clinical features :

Male child with recurrent UTI.

Investigation :

1. MCU
2. USG } Keyhole sign.

Mx : Fulguration of the valve.

MCU

USG

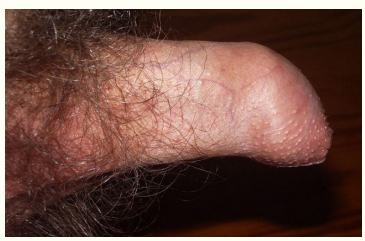
Phimosis 00:37:28

Inability to retract foreskin.

Clinical features :

- Asymptomatic.
- Symptomatic :
  - Ballooning of foreskin.
  - Balanoposthitis.
  - Difficult micturition.

Mx : Circumcision.



Paraphimosis 00:37:50

Failure to reposition foreskin after catheterisation → Constriction ring around the penis.

Mx : Conservative reduction —Fails→ Dorsal slit.

----- Active space -----

Peyronie's Disease & Priapism

00:38:22

Peyronie's Disease :

Calcific deposition in corpora → Penis bends to one side.

C/F : Pain during intercourse.

Dx : Clinical examination + MRI.

Mx : Intralesional collagenase Clostridium histolyticum (Xiaflex) injection

↓ Fails

Nesbit's technique/16 dot technique.

Priapism :

- Prolonged erection >4 hours.
- Erection >6 hours → Ischemia/necrosis of penis.

Types :

	High flow priapism	Low flow priapism
Etiology	↑Blood flow into penis	Venous obstruction, M/C
Causes	Secondary to : • Trauma. • Spinal injury. • Papaverine injection.	Hypercoagulable states : • Children • Leukemia. • Sickle cell anemia.
Pain	Painless	Painful
Penile ABG	Oxygenated blood	Deoxygenated blood

Ix : Angiography for low flow priapism.

Mx : Sedate patient → Adrenaline inj. —Fails→ Shunt Sx : Grey hack shunt. (Corporo saphenous)

Penile Cancer

00:40:52

Squamous cell carcinoma.

Premalignant Conditions :

- Bowens disease of the shaft.
- Erythroplasia of Queyrat (Reddish papules).
- Balanitis xerotica obliterans.
- Genital warts : HPV.
- Leukoplakia.

Ulceroproliferative lesion

----- Active space -----

Jackson Staging :

T1 : Skin involved.

T2 : Corpora involved.

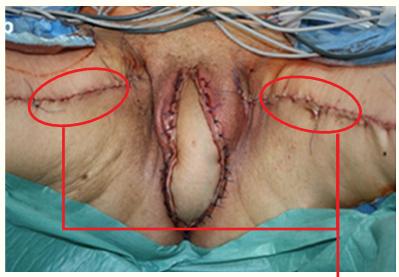
T3 : Urethra involved.

T4 : Adjacent structures involved.

Management :

Dx : Biopsy of lesion.

Tumor Mx	
A. In situ carcinoma	Topical 5-FU/laser
B. Distally placed	Partial penectomy (If residual stump : ≥2 cm)
C. Proximally placed	Total amputation + Perineal urethrostomy
Lymph node Mx	
Not enlarged	Sentinel lymph node biopsy.
T3, T4	Prophylactic superficial inguinal lymph node dissection
Enlarged	Ilioinguinal lymphnode clearance or radiotherapy



Total amputation + Ilioinguinal lymph node clearance

Undescended Testis

00:44:47

Testicular Descent :

Triggers :

1. Differential growth of abdominal wall : Most important.
2. Hormonal factors.
3. Pull of gubernaculum : Least important.

Normal descent :

Iliac fossa (6 months) → Inguinal canal (7 months) → Superficial ring (8 months) → Scrotum (9 months)

Features :

- M/c site : Inguinal canal.
- Right > Left.
- B/L : Cryptorchidism.

Changes
• Decreased volume • Increased risk of intra tubular germ cell neoplasm. • Sertoli cells : More affected (Spermatogenesis affected) • Leydig cells : Less affected (Normal secondary sexual character)

Complications
• T : Trauma • E : Epididymoorchitis • S : Sterility • T : Torsion • I : Indirect inguinal hernia (M/C) • S : Seminoma

----- Active space -----

Consequences (Updated) :

- Men with undescended testis : ↓Fertility (Even after orchidopexy).
- Unilateral cases : Infertility rates same as general population.
- B/L cases operated as adults : Azoospermic & infertile.

Malignancy risk :

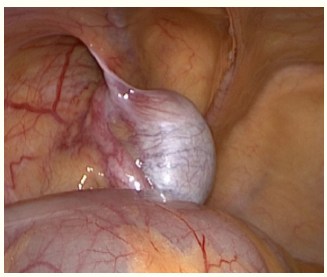
- m/c : Seminoma.
- Risk of cancer :
  - Sx before puberty : 2-3 times
  - Sx after puberty : 5-6 times

} more than the general population

Management :

1. B/L non-palpable testis :

β-hCG injection given
- No response → Anorchia.
- Increased testosterone (And increased FSH, LH) → After 5-6 months → Laparoscopy ± exploration.


Intra abdominal testis

2. U/L non-palpable testis :

Laparoscopy
- Blind-ending vessels → Monorchia → Excise remnant.
- Vessels exiting internal ring → Inguinal exploration → Orchidopexy
- Intra abdominal testis → Necrosis ⊕ → Orchidectomy.

Orchidopexy
- Manoeuvre to bring the testis down.
- 3-point fixation is done.

Ectopic Testis :

- Testis deviated from normal path of descent.
- m/c site : Superficial inguinal pouch.

Mx : Orchidopexy.

Retractile Testis :

- Normal variant.
- Testis in scrotum but occasionally jump into inguinal canal.

Mx : Reassurance.

Testicular Torsion

00:50:10

Risk Factors :

- Testicular inversion.
- Torsion of cyst of Morgagni → Blue dot sign.
- Undescended testis.
- Bell Clapper testis (High attachment of tunica vaginalis).

----- Active space -----

Clinical Features :

- Acute scrotal pain & swelling (D/d : Epididymo-orchitis).
- Prehn sign : Pain ↑ (Pain in epididymo-orchitis).
- Deming sign ⊕ : Affected testis lies at a higher level.
- Angel sign ⊕ : Transversely placed testis.
- 720° twist (Double twist) : Rapid ischemia.

Note :

- Twisting within :
  - <6 hours : ≈ 100% salvageable.
  - >24 hours : <20% salvageable.
- Prophylactic orchidopexy is done on the other side always.

Hydrocele & Varicocele 00:52:42

HYDROCELE

Accumulation of fluid in tunica vaginalis.

m/c : Vaginal hydrocele.

Transillumination ⊕

Types of Vaginal Hydrocele :

1. Primary :
   - D/t ↓ absorption.
   - m/c type.
   - C/f :
     - Tense swelling.
     - Testis not palpable separately.
     - Brilliantly transilluminant.
2. Secondary : D/t ↑secretion 2° to infections (m/c), trauma & tumours.

Management :

Surgery → Smaller sac : Lord's plication.
→ Larger sac : Jaboulay's procedure (Eversion of sac).

VARICOCELE

Features :

- Dilated tortuous pampiniform plexus of veins.

↓

↑Temperature inside testis → Infertility.

----- Active space -----

- Left > Right :
  - Lt testicular vein is longer.
  - Opens at right angles to the left renal vein.
  - Sigmoid colon can press on lt testicular vein.
  - Lt RCC can grow along the renal vein → 2° varicocele.

Clinical Features :

- Majority : Asymptomatic.
- Infertility.

O/E : Bag of worms consistency.

Mx :

IOC : Doppler.

Rx : Percutaneous embolisation of gonadal veins (1st line).

- Percutaneous Rx not possible.
- Recurrence.

↓

Surgical ligation : Microsurgical varicocelectomy.

Fournier's Gangrene

00:56:20

Features :

- Necrotising fasciitis in perineal region (Synergistic : Aerobic + Anaerobic bacteria).
- m/c seen in immunocompromised patients :
  - DM.
  - Alcoholics.
- Testis spared d/t dual blood supply.

Management :

1. Aggressive debridement.
2. Broad spectrum antibiotics + IV fluids.
3. Hyperbaric oxygen (Latest).

meleney's gangrene

Gangrene extending into the abdominal wall.

Testicular Tumours

00:57:45

Most Common :

- In children : Yolk sac tumour.
- Overall : Seminoma.
- In elderly : Lymphoma.

Cannonball metastasis

----- Active space -----

Clinical Features :

- Painless testicular mass.
- Abdominal lump : Paraaortic lymph nodes (1st draining LN).
- Precocious puberty & masculinisation : Leydig cell tumour.
- Feminisation & gynecomastia : Sertoli cell tumours.


Seminoma

Tumour Markers :

1. AFP
2. β-hCG } Included in TNMS staging.
3. LDH
4. PLAP : ↑ in seminoma (Not included in TNMS).

Diagnosis :

Suspected case → Chevassu manoeuvre : ⊕ → High inguinal orchidectomy.
High inguinal incision
f/b frozen section.

HPE : Seminoma → Lymphocytic infiltration (Good prognosis).

Note : NO FNAC (Can lead to spread).

Management :

Post orchidectomy.

Stage	Seminoma	Non seminomatous
I	One cycle of carboplatin + RT	Chemo BEP ± RPLND
II	Chemo BEP	Chemo BEP + RPLND
III & IV	Chemo BEP + RT	

BEP : Bleomycin + etoposide + cisplatin.

RPLND : Retroperitoneal LN dissection.

----- Active space -----

SPECIALITY SURGERY

Graft

00:00:38

Split thickness skin graft (STSG)	Full thickness skin graft (FTSG)
Donor site	
AKA Thiersch graft	AKA Wolfe graft
Epidermis & part of dermis taken	Epidermis & whole dermis taken
m/c donor sites : • Anterolateral thigh • Buttocks	m/c sites : • Post auricular skin • Supra/infraclavicular skin
Only dressing done for donor site after harvesting graft	Donor site sutured after harvesting graft
Donor site can be reused	Donor site cannot be reused
Recipient site	
Secondary contracture : Occurs when graft has been placed on the recipient bed	Primary contracture : • Occurs immediately after harvesting graft • Depends on dermis
Better survival of graft	• Cosmetically better • More resistant to trauma .

Humby's Knife

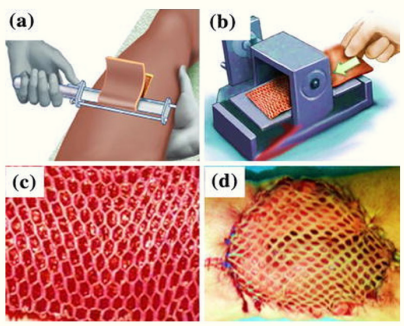
STSG : Punctate hemorrhages

Healed STSG donor site

FTSG

Meshing of STSG

- ↑surface area of graft
- Prevents hematoma formation



Graft Survival :

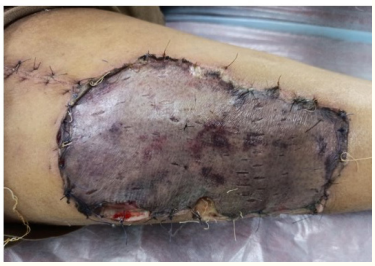
Methods :

1. Imbibition : 1 – 2 days.
2. Inosculation : 2–4 days (Graft draws nutrients by giving out buds).
3. Neovascularization : >4 days (Anastomosis of graft & recipient).

----- Active space -----

Causes of graft failure :

1. Seroma/hematoma formation (m/c).
2. Infection.
3. Movement/shearing force.
4. Poor recipient bed :
   - Excessive granulation tissue.
   - Lack of periosteum.
   - Infected recipient bed.



Graft failure

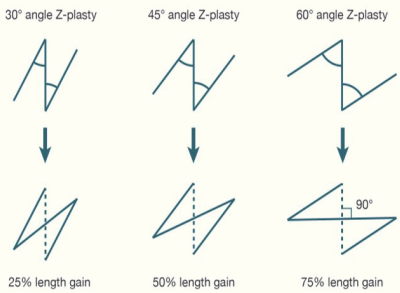
Flaps

00:05:07

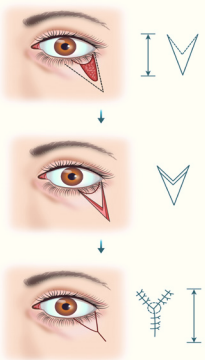
Flap has independent blood supply.

Random Flaps :

- Based on dermal vessels.
- Eg : V-Y plasty/Z-plasty.
- Elongation of wound :
  Helps in post burn contractures.



Z-plasty



V-Y plasty

Rhomboid/Limberg flap :

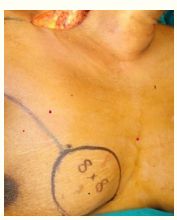
- Type of random flap.
- Used in pilonidal sinus.

Rhomboid flap

Axial Flap :

Based on known blood vessels.

1. Deltopectoral flap : Floor of mouth reconstruction



2. PMMC : Pectoralis major myocutaneous flap, m/c used in head & neck surgery

3. Abbe Estlander flap : Angle of mouth & lip reconstruction

4. Latissimus dorsi flap :
Based on thoracodorsal pedicle

----- Active space -----

Abdominal Flaps :

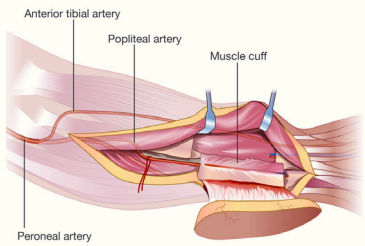
1. TRAM : Transversus rectus abdominis myocutaneous flap.
Muscle used for flap ⟶ ↑risk of incisional hernias

2. DIEP : Deep inferior epigastric artery perforator flap
- Only skin + fat ⟶ No abdominal wall weakness.
- Best flap for breast reconstruction.

Free Flap :

Disconnected from donor site ⟶ Anastomosed at recipient site.

1. Radial artery forearm flap :
- Used for head & neck surgery.
- Prior test : Modified Allen's test.



2. Free fibular flap :
- Based on peroneal vessels.
- Use : Mandibular reconstruction.

Mathes and Nahai Classification for Axial Flaps :

Mathes and Nahai	Dominant pedicle	Minor pedicle	Muscle
Type I	1	-	• Gastrocnemius • Rectus femoris • Tensor fascia lata
Type V	1	Multiple	• Pectoralis major • Latissimus dorsi

Flap Failure :

D/t vessel blockade.

	Arterial block	Venous block
Temperature	Cold	Warm
Color	Pale	Congested
Capillary refill	Reduced	Quick
Pinprick	↓Blood flow	↑Blood flow

Breast flap failure

Bed Sores

00:11:25 ----- Active space -----

Staging of Pressure Sores :

Stage	Description
1	Non blanchable erythema without a breach in epidermis
2	Partial thickness skin loss involving epidermis and dermis
3	Full thickness skin loss extending into the subcutaneous tissue
4	Full thickness skin loss involving muscle, bone, tendon or joint

Features :

- Pressure >30 mmHg ⟶ Bed sore.
- M/c site : Ischium > Greater trochanter > Sacrum.

Grade 4 bed sore

Risk factors :

- Prolonged immobilisation.
- Malnutrition.
- Maceration of area.

Prevention :

- Frequent change in position : 10 minutes every 2 hours.
- Air/water mattress : To offload the weight.

Management :

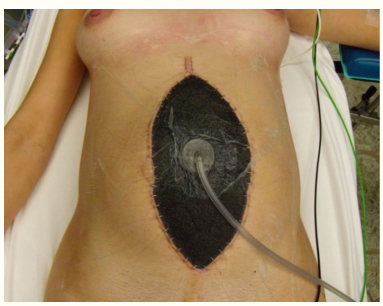
Grade I : Keep dry + offloading.

Grade II/III : Debridement + VAC dressing.

Grade IV : Debridement + VAC/flap.

Vacuum Assisted Closure (VAC) :

- AKA negative pressure dressing : -120 mmHg to -125 mmHg.
- Hastens healing process.



VAC dressing

Uses :

- Chronic non-healing wounds.
- Venous ulcer without slough.
- Burn wound without eschar.
- Bed sores after debridement.
- Diabetic ulcer without osteomyelitis.

----- Active space -----

Wound Healing

00:14:51

Phases :

Hemostasis → Inflammation phase → Proliferative phase → Remodelling.

Wound Strength :

- 10% of normal : After 1 week.
- 70–80% of normal (maximum) : After 3 months/12 weeks.
- Original strength is never regained.

Collagen type :

Type 3 (Initially) → Type 1 : Type 3 = 4 : 1.
(In remodelling)

Types of Healing :

1. Primary intention : Clean incised wound —Sutured→ Good scar.
2. Secondary intention : Wound left open (D/t infection) —Gradual contracture→ ↑Granulation tissue, hypertrophic scar.
3. Tertiary intention : Wound left open initially → Sutured after few days.
   (Delayed primary closure)

Keloid v/s Hypertrophic Scar :

Keloid	Hypertrophic scar
m/c site : Sternum, shoulder region	m/c site : Extensor surface
Racial predisposition for dark skinned people	More common in children
Grows beyond the boundary of scar	Remains in the boundaries of scar
Doesn't subside with time & pressure	Subsides with time & pressure
mx : Intralesional triamcinolone	mx : Silicone pads/gel
	

Cleft Lip/Palate

00:18:17

Features :

- Seen in 1 in 600 live births.
- Males > females.
- m/c defect : Combined lip plus palate.

Cleft lip

----- Active space -----

Documentation :

Capital letters (Eg : "L") for complete involvement.

Small letters (Eg : "l") for partial involvement.

L : Lip.
A : Alveolus.
H : Hard palate.
S : Soft palate.
A : Alveolus.
L : Lip.

} LAHSAL system

Management :

Cleft palate :

- Timing :
  - Soft palate : 3 – 6 months.
  - Hard palate : 9 – 12 months.
- Repair techniques :
  - Wardill-Kilner.
  - V-Y plasty.

Cleft lip :

- Timing of repair : 3 – 6 months.
- Repair techniques :
  - Millard.
  - Tennison.

Transplant Surgery 00:20:34

Types of Grafts :

- Autograft : Graft from the same person (Eg : Skin graft).
- Isograft : Graft from identical twin (Eg : Kidney transplant).
- Allograft : Graft from same species.
- Xenograft : Graft from different species.

Maastricht Classification :

Maastricht classification	Presentation of death	DCD situation	Organs procurable
I	Dead on arrival	Uncontrolled	Heart valves, cornea
II	Unsuccessful resuscitation	Uncontrolled	Kidney, heart valves, cornea
III	Anticipated cardiac arrest	Controlled	All organs except heart
IV	Cardiac arrest in brain dead donor	Controlled	
V	Unexpected cardiac arrest in a hospital patient	Uncontrolled	

----- Active space -----

Flushing of UW Solution :

UW solution at 4°C ⟶ Flushed through aorta & portal vein of donor ⟶ Static cold storage of harvested organs.

Advantages :

- Flushes out blood to prevent thrombosis.
- Cools organs : ↓metabolic needs.
- Replaces ECF with preservative fluid.

Disadvantage : Delayed graft function.

Cold ischemia time
• Longest : Kidney (24–36 hrs)
• Shortest : Heart (3–6 hrs)

Key components of UW solution
1. Hydroxyethyl starch
2. Lactobionic acid
3. Adenosine
4. Allopurinol

Normothermic Machine Perfusion :

- Used for heart, lung, liver & kidney perfusion.
- Provides more physiological environment.

Advantage : Early allograft function (Replenishes depleted ATPs).

Renal Transplant

00:24:05

- Most common indication in adults : Diabetic nephropathy.
- Most common indication in children : Glomerulonephritis.

Extended Donor Criteria for Renal Transplant :

- Fit patient more than 60 years (OR)
- More than 50 with two or more of the following :
  a. Death due to stroke
  b. History of HTN
  c. Serum creatinine >1.5 mg/dL
  } Dead donors.

Dual Kidney Transplant :

- Involves transplantation of a pair of marginal quality kidneys from one donor into one recipient in order to provide adequate nephron mass.
- Usually transplanted in same iliac fossa.
- Used in elderly DCD donors or expanded donor criteria.

Anastomosis :

- Heterotopic (Iliac fossa).
- Structures anastomosed :
  - Ureter ⟶ Bladder.
  - Renal vein ⟶ External iliac vein.
  - Renal artery :
    - Dead donor ⟶ External iliac artery (End to side).
    - Living donor ⟶ Internal iliac artery (End to end).

Complications :

----- Active space -----

1. Rejection :

Hyperacute	Acute	Chronic
• Dusky kidney on table • D/T preformed antibodies (Anti-HLA Ab) • Type II hypersensitivity • HPE : Intravascular thrombosis	• Immunological/non-immunological • ↓incidence d/t effective immunosuppression >90% 5-year survival of graft	• m/c type of rejection • 6 months after transplant • Type IV hypersensitivity • HPE : Glomerular sclerosis

2. Infection : Maximum in 1st 6 months.
   - m/c in 1st month : Bacterial.
   - m/c overall : Viral (m/c ⟶ CMV)
3. Malignancy : Skin cancer (SCC)
4. Post-transplant lymphoproliferative disorder (PTLD) : D/t EBV (B-cell mediated)
5. Renal vein thrombosis : m/c vascular complication.

Liver Transplant

00:28:45

Indication :

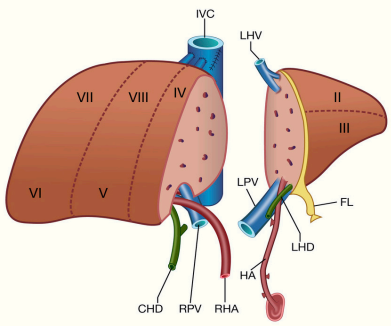
m/c in adults : Cirrhosis.

m/c in children : EHBA.

Note : HLA matching is not important.

Types :

1. Dead donor liver transplant (DDLT).
2. Live donor liver transplant (LDLT).
3. Split & reduced size liver transplant :
   - Segments 2 + 3 donated to child.
   - Segments 4 + 5 + 6 + 7 + 8 donated to adult.
4. Auxiliary LT :
   - Recipient's liver is not removed.
   - Donor liver : Piggybacks the existing liver.
5. Domino LT : Donor & recipient both suffer the same systemic disease.
6. Paired exchange programme.



Split LT

Sequence of Anastomosis :

1. Suprahepatic IVC.
2. Infrahepatic IVC.
3. Portal vein.
4. Hepatic artery.
5. Bile duct.

----- Active space -----

Complications :

1. Chronic rejection : Vanishing duct syndrome.
2. Hepatic artery thrombosis.
3. Infections
4. PTLD
5. Cancer.

} Same as renal transplant.

King's College Criteria :

- Used for acute liver failure.
- Has acetaminophen induced & non-acetaminophen induced.

Liver Transplant for Hepatic Malignancy :

LT simultaneously treats both the tumor & underlying cause.

Milan criteria : Indication for LT in HCC.

- One lesion ≤ 5cm.
- Two to three lesions ≤3 cm.
- No vascular invasion
- No metastatic disease

} On imaging.

Candidates :

- Children with hepatoblastoma & HCC (m/c).
- Liver metastasis from colorectal & neuroendocrine tumors.

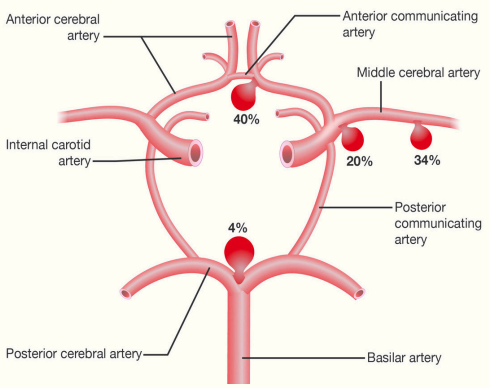
Note : Sequence of heart transplant.

- Lt. atrium → Rt. atrium → Pulmonary artery → Aorta.
- If suspecting rejection → Subendocardial biopsy.

Berry Aneurysm

00:33:39

- Occurs in the circle of Willis.
- Rupture → SAH.
- m/c site : Junction of anterior communicating artery with ACA.
- m/c site of rupture : Apex of aneurysm.



Subarachnoid Hemorrhage :

Clinical features : Thunderclap headache (worst headache of life).

Diagnosis :

- NCCT.
- Xanthochromia in CSF (Delayed).

Management :

Angiography f/b Intervention Post-op CCBs (Nimodipine) : To prevent vasospasm.

- Coiling (Interventional radiology).
- Surgical clipping of aneurysm.

----- Active space -----

CNS Tumours

00:35:37

- m/c 1° brain tumour : Glioma > Meningioma.
- m/c 1° brain tumour in children : Medulloblastoma.
- m/c brain tumour : Metastasis.

IOC : MRI.

Note : PET-CT can miss brain lesions.

Treatment : Surgery, chemotherapy, radiotherapy.

Brain Metastasis :

- m/c cancer metastasizing to cerebrum : Lung cancer.
- m/c cancer metastasizing to leptomeninges : Breast cancer.

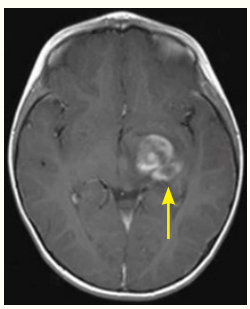
Management :

- Radiotherapy : For multiple mets.
- Surgery : For solitary lesions.
- Steroids : DOC for vasogenic edema d/t ↑ICT.

Astrocytoma :

Grade 1 :

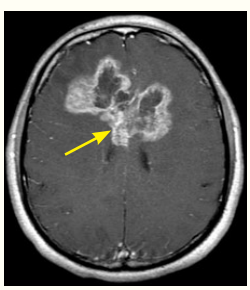
- Pilocytic astrocytoma.
- m/c astrocytoma in children.
- Presents as mural nodule.
- Rx : Excision.



Mural nodule

Grade 4 :

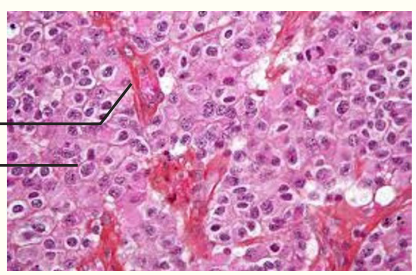
- Glioblastoma multiforme (Bad prognosis).
- Crosses corpus callosum.
- Forms butterfly shaped tumour.
- Rx :
  - Surgery → Radiotherapy.
  - Oral temozolomide.



Butterfly tumor

Oligodendroglioma :

- Chicken wire vascularity.
- Fried egg appearance.



HPE

----- Active space -----

TRAUMA AND BURNS

Basics of Trauma Management

00:00:42

Pre Hospital Care :

Information from :

Driver/responder	Patient
Mnemonic : MIST • Mechanism of injury • Injuries • Sign & symptoms • Treatment given	Mnemonic : AMPLE • Allergies • Medications • Past history • Last meal • Events leading to trauma

Transfer of patient :

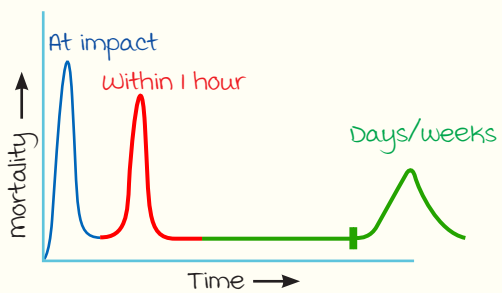
Supine position : 3 Straps for stabilization → Head & neck.
→ Thorax.
→ Pelvis.

Manual in-line stabilization

Complete immobilization (c + d)

- Prone position : Prevent aspiration.
- Never transferred in lateral position (Cervical spine cannot be stabilized).
- 2 persons required for helmet removal in trauma patients.

Trimodal Distribution of Mortality in Trauma :



Causes of mortality :

----- Active space -----

At impact	within 1 hour (Life-threatening)	Days/weeks
• Severe head injury • Aortic transections	• Airway causes : – Airway obstruction – Tracheobronchial injury • Breathing : – Open pneumothorax – Tension pneumothorax • Circulatory : – Acute circulatory arrest – Haemothorax – Cardiac tamponade	• Delayed head injury • Sepsis

Golden hour : 1st hour following trauma

(If patient managed within this 1 hour → ↓mortality).

Triage :

Sort out on the basis of treatment priority.

Priority group			Description
Number	Name	Colour	
P1	Emergency/ Immediate	Red	• Causes that lead to death within 1 hour • Mx : immediate
P2	Urgent	Yellow	• Includes fractures • Mx : Stabilize first, Rx can wait
P3	Delayed	Green	• Walking wounded patients (Minor bruises, lacerations) • Mx : First aid
P4	Expectant	Blue	• Moribund patients • Rx : – supportive care (Pain relief) – Definitive Rx not possible
–	Dead	Black	Dead bodies

Advanced Trauma Life Support (ATLS)

00:05:52

ATLS :

1° Survey —Followed by→ 2° Survey

(Stabilizing life threatening injuries : ABCD) (Detailed : to look for other injuries).

----- Active space -----

PRIMARY SURVEY

1. Cervical Spine Assessment and Stabilization :

Assessment NEXUS criteria :

- Neurological deficit
- EtOH (Alcohol/Intoxication)
- Extreme distracting injuries
- Unable to provide history (Altered sensorium)
- Spinal tenderness (midline)

If any I ⊕ → Imaging : X-ray cervical spine ± CT head.

2. Airway :

Danger signs
• Unable to speak • GCS ≤8 • Coma • Severe maxillofacial injury

Any ⊕ → Secure airway (Orotracheal intubation)

↓ if fails

Emergency mx : Needle cricothyroidotomy → Definitive mx : Tracheostomy

Tracheostomy

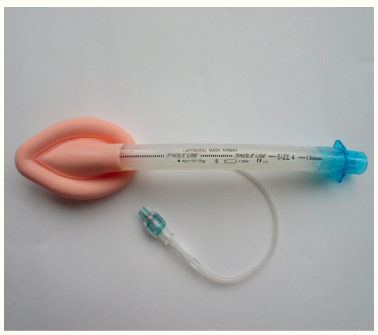
Note :

Nasotracheal intubation : C/I in head injury (D/t anterior cranial fossa #).

Needle cricothyroidotomy :

- 2–3 minutes procedure :
  Local anaesthesia → Needle is put through cricothyroid membrane.
- Useful for 20–30 mins : Can carry out tracheostomy.
- C/I in < 12 years of age.

Video laryngoscope (used for intubation)



Laryngeal mask airway (LMA) (Easier to insert)

3. Breathing :

- Chest examination.
- Pulse oximetry (Adjunct).
- Imaging : Chest X ray (AP view) ; Pelvic and cervical x-ray (Adjuncts).
- eFAST scan (Adjunct).
- Chest tubes placed (If required).

Note : CT scan is not a part of 1° survey.

4. Circulation :

----- Active space -----

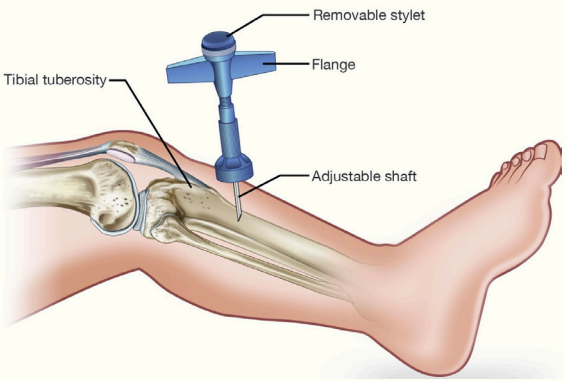
- Minimum 2 IV Cannulas inserted : 18G (Minimum)/Grey/Orange.
- 1 litre of IV fluids administered (ATLS 10th edition update).
- If IV line insertion fails :

Emergency method :

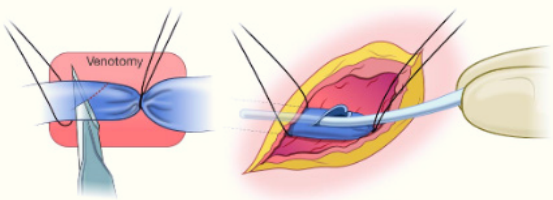
Intraosseous	Venous cut down
Needle inserted just below tibial tuberosity	Done in great saphenous vein (Anterior to medial malleolus)

Definitive method :

- Central line.
- m/c insertion site : Internal jugular vein.



Intraosseous infusion



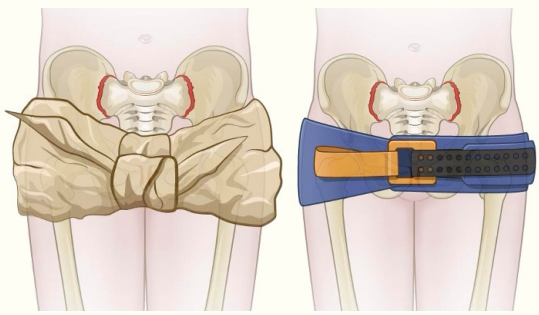
Venous cut down

CRASH-2 trial :

Systolic BP <90 mmHg
Heart rate >110 bpm
→ Give Tranexamic acid : 1g infusion (Over 10 mins) → F/b → 1g infusion (Over 8 hrs) → ↓ mortality.

Pelvic binder :

- Used in trauma + hypovolemic shock.
- Bed sheet/formal binder tied till pelvic # is ruled out.
- Stops bleeding by tamponade effect.



Pelvic binder

Damage control resuscitation :

- Permissive hypotension.
- Minimization of crystalloids.
- 1 : 1 : 1 blood product ratios.
- Early haemorrhage control.

----- Active space -----

5. Disability :

Glasgow coma scale (GCS) :

Behaviour	Response	Score
Eye opening	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
	Cannot be tested (D/t intubation)	NT
Best verbal response	Fully oriented	5
	Confused	4
	Inappropriate words	3
	Incomprehensible	2
	No response	1
	Cannot be tested	NT
Best motor response	Obeys commands	6
	Moves to localised pain	5
	Flexion withdrawal to pain	4
	Abnormal flexion (Decorticate)	3
	Abnormal extension (Decerebrate)	2
	No response	1

- GCS-P score :

Pupils unreactive to light	Pupils reactivity score (PRS)
Both pupils	2
One pupil	1
Neither pupil	0

Calculation : GCS-P = GCS − PRS.

- Head injury (Based on GCS) :

mild : 13–15.
moderate : 9–12.
severe : ≤8.

Note :

Log roll :

- To examine the back of trauma patients (4 people required).
- If limb fracture ⊕ : 5th person required.

Trauma Scores :

Revised trauma score	mangled extremity severity score (MESS)
• Systolic BP • Respiratory rate • GCS	• Type of injury • Shock ⊕ / ⊖ • Signs of ischemia ⊕ / ⊖ • Age group Score ≤ 6 : Limb salvageable Score ≥ 7 : Amputation necessary

Abdominal Trauma

00:19:02 ----- Active space -----

m/c organ/structure injured :

- Overall & blunt trauma : Spleen.
- Penetrating injuries : Liver > small intestine.
- Gun shot wound (GSW) : Small intestine.
- Seat belt syndrome : Mesentery (Compressed b/w seat belt and vertebrae).
- Deceleration injury : Duodeno-jejunal flexure (DJ flexure).
- Children (Overall) : Spleen > Kidney.

MECHANISMS

Blunt Abdominal Trauma :

Mx :

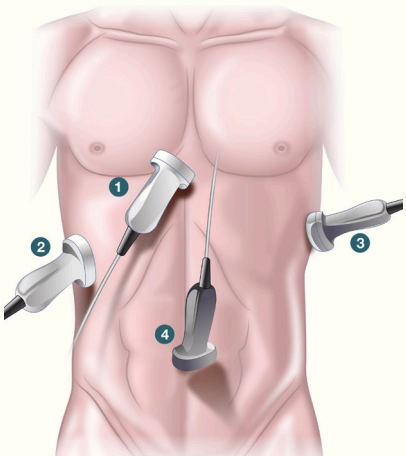
FAST (First Ix) → Hemodynamically
- Stable : CECT abdomen (IOC).
- Unstable : FAST (IOC) → Fluid (+) → Open exploration or laparotomy.

Focused assessment sonogram in trauma (FAST) :

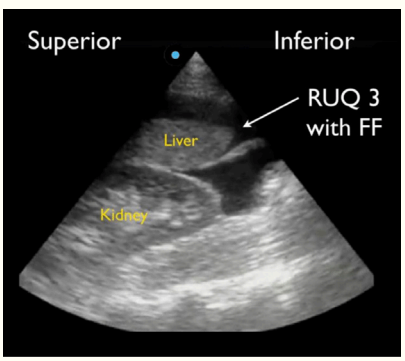
- USG done in emergency room.
- Detects free fluid in abdomen/pericardium.
- Probe placement :

Order	Sites
1	Epigastrium (Cardiac window)
2	Right hypochondrium
3	Left hypochondrium
4	Suprapubic region

- eFAST (Extended FAST) : Probe placed at 4 (FAST sites) + 2 (Right + Left thorax).
- Disadvantages :
  - Will not reliably detect < 100 cc of free blood.
  - Does not directly identify hollow viscus injury.
  - Not reliable in penetrating trauma.
  - may need repeating/supplementing with other investigations.
  - Unreliable for assessment of retroperitoneum.



Sites of probe placement



FAST : hypoechoic collection

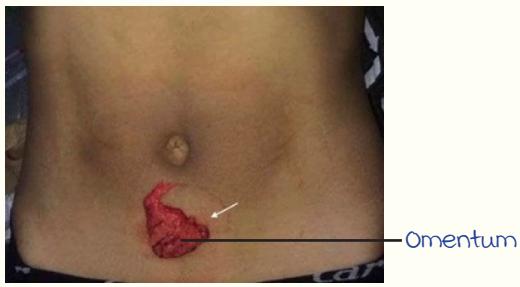
----- Active space -----

Penetrating Abdominal Trauma :

- **Injury superficial to peritoneum**
  - Sx : Local exploration and suturing
  - Ix : CECT.
- **Injury causing peritoneal breach :**
  - Peritonitis (Rebound tenderness ⊕, guarding/rigidity ⊕).
  - Omentum hanging out.
  - Bile stained dressing
    - No Ix done
  - Sx : Laparotomy.

Note : Penetrating object.

- Never remove in ER d/t ↑bleeding risk.
- Always remove in OT.



Penetrating trauma

Diagnostic peritoneal lavage (DPL) :

- Indication : FAST is not available.
- Positive DPL :
  - 10 cc gross blood aspirated
  - > 1 lakh RBC/mm^3
  - >500 WBC/mm^3
  - S. amylase >175 IU/L
  - Presence of fecal content

Any 1 ⊕ → Sx : Laparotomy.

SPLENIC TRAUMA

- # 9–11 rib on left side
- Bruising along lower left chest wall

→ Suspect splenic injury.

Grades of Splenic Trauma :

Grade	Features
Grade 1	• Subcapsular hematoma < 10% surface area (SA). • Parenchymal laceration < 1 cm depth. • Capsular tear.
Grade 2	• Subcapsular hematoma 10–50% SA. • Intraparenchymal hematoma <5cm. • Parenchymal laceration 1 – 3 cm depth.
Grade 3	• Subcapsular hematoma > 50% SA, ruptured subcapsular or intraparenchymal hematoma ≥ 5 cm. • Parenchymal laceration > 3 cm depth
Grade 4	• Any injury in presence of splenic vascular injury or active bleeding confined within splenic capsule. • Parenchymal laceration involving segmental/hilar vessels producing ≥ 25% devascularisation.
Grade 5	Shattered spleen.

Note :

----- Active space -----

Updated definitions

- Vascular injury (Pseudoaneurysm/Arteriovenous fistula) : Vascular contrast ↓ in attenuation with delayed imaging.
- Active bleeding (From a vascular injury) : Vascular contrast ↑ in size/attenuation in delayed imaging.

Splenic trauma

Management :

Grade of injury	Hemodynamic status	Ix	Management
I and II	Usually stable	CECT (IOC)	• Conservative (monitor vitals, hematocrit, serial 24h CECT) • If ↑ grade of injury/contrast blush on CT ↓ Angioembolization ↓ Fails/unstable Sx : Splenic preservation/ Splenorraphy
III	Stable		Same as grade I, II
	Unstable		Same as grade IV, V
IV and V	Usually unstable	FAST (IOC)	Sx : Splenectomy

Post-splenectomy Complications :

1. Left lower lobe atelectasis : m/c complication.
2. Haemorrhage.
3. Pancreatic injury : Tail of pancreas affected.
4. Hematological changes :
   - Transient ↑ in all 3 cell lines (Persist x 2 weeks).
   - Permanent changes : Basophilic stippling, Reticulocytes, Howel Jolly bodies, Hypersegmented WBC's.
5. Opportunistic post splenectomy infections (OPSI) :
   - m/c organism encapsulated bacteria :
     - Pneumococcus (m/c organism).
     - Meningococcus.
     - H. influenzae.

----- Active space -----

- Features :
  - Children > Adults.
  - Occurs within 1st 2 years of splenectomy.
  - High mortality.
  - m/c seen in splenectomy for : Hematological conditions > Trauma.
- Prevention : Vaccines → In elective Sx : 2 weeks prior (↑Antibody titre).
  → In emergency Sx : Post-op day 2.

LIVER TRAUMA

Grades of Injury :

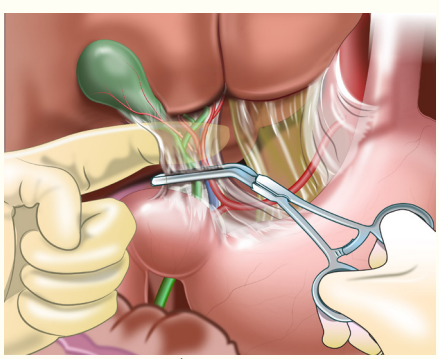
Grade	Features
Grade 1	• Hematoma, subcapsular < 10% SA. • Laceration : Capsular tear, < 1 cm parenchymal depth.
Grade 2	• Hematoma : Subcapsular, 10 – 50% SA. • Hematoma : Intraparenchymal, <10 cm diameter. • Laceration : Capsular tear 1 – 3 cm parenchymal depth, < 10 cm length.
Grade 3	• Hematoma : Subcapsular, > 50% SA. • Hematoma : Intraparenchymal, > 10 cm. • Laceration : Capsular tear, > 3 cm depth. • Vascular injury with active bleeding contained within liver parenchyma.
Grade 4	• Laceration : Parenchymal disruption involving 25 – 75 % of lobe or 1 – 3 Couinaud segments. • Vascular injury with active bleeding breaching the liver parenchyma into peritoneum.
Grade 5	• Laceration : Parenchymal disruption involving > 75% of lobes. • Vascular : Juxtahepatic venous injuries.

Management :

Liver trauma → Resuscitate → Unstable → Surgery.
Resuscitate → Stable → Investigate, imaging, laparoscopy, angiography → Remains stable → Manage complications → Discharge.

Pringle's manoeuvre :

- Compression of the portal triad for 10–15 mins at foramen of Winslow.
- Portal triad : Hepatic artery, common bile duct & portal vein.



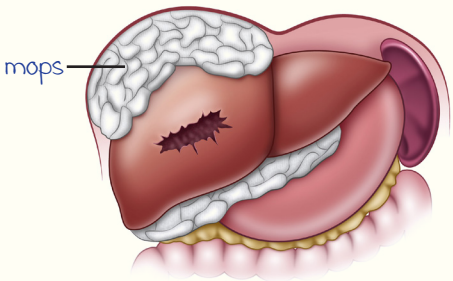
Pringle's manoeuvre

----- Active space -----

- Manoeuvre → If bleeding ↓ : Cause is portal vein/hepatic artery.
  → If bleeding continues : Cause is hepatic veins.
- Significance :
  - Temporarily control bleeding.
  - Identification of source of bleeding.

Packing :

Bleeding can be stopped by mops (D/t tamponading effect).

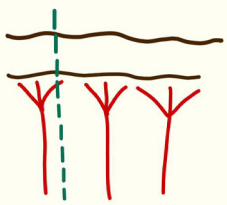
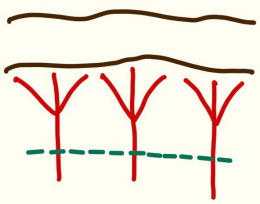


Packing

MESENTERIC INJURY

M/c in seat belt syndrome.

Types :

Longitudinal tear	Transverse tear
	
Only 1 branch cut, No loss of vascularity	All vessels are cut, loss of vascularity
Sx : Repair of tear	Sx : Resection & Anastomosis

DAMAGE CONTROL SURGERY (DCS) AND EARLY TOTAL CARE (ETC)

Criteria for DCS	Criteria for ETC
• Hypothermia (< 34°C) } Terrible triad of trauma • Acidosis (pH < 7.2) } Terrible triad of trauma • coagulopathy } Terrible triad of trauma • S. Lactate (>5 mmol/L) • BP <70 mmHg • Transfusion approaching 15 units • Injury severity score >36	• Stable hemodynamics • S. lactate : (N) • Coagulation : (N) • Normothermia • No need of vasoactive/inotropic stimulation

ETC :

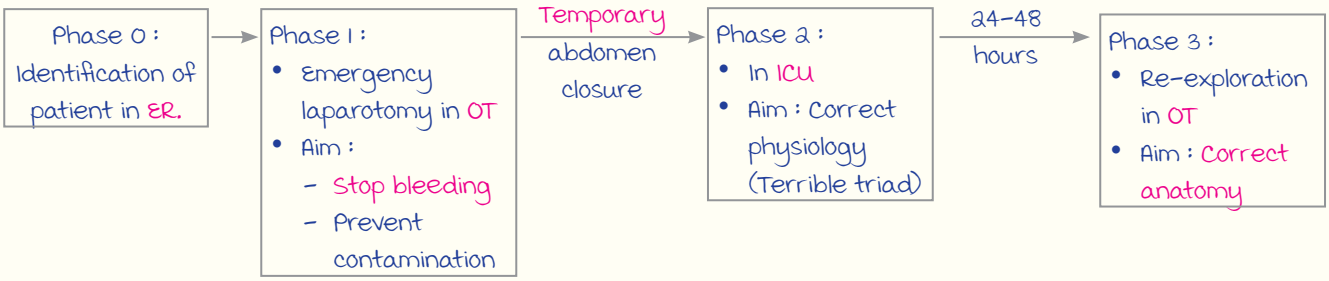
- Definitive Mx of patient's injuries within 36 hours (After resuscitation).
- ETC approach —Patient deteriorates→ DCS approach.

----- Active space -----

DCS (Abbreviated Laparotomy) :

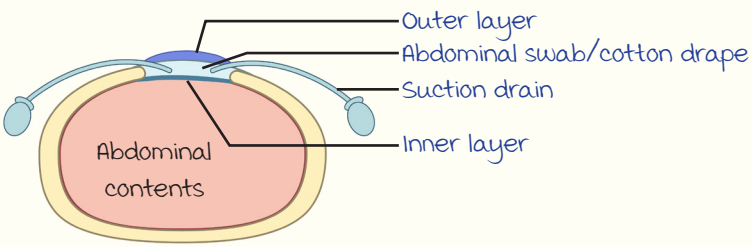
Done in terrible triad of trauma.

Phases of DCS (ATLS) :

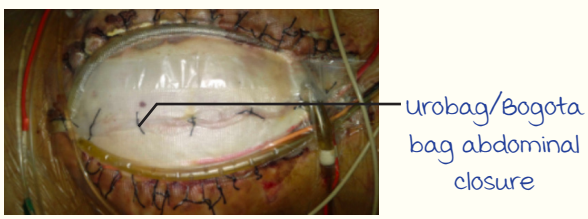


Stages of DCS :

Stage	Mx
1	Patient selection
2	Control of Haemorrhage and contamination
3	ICU care
4	Definitive Sx
5	Abdominal closure



Temporary abdominal closure



ABDOMINAL COMPARTMENT SYNDROME (ACS)

Intra-abdominal pressure (IAP) : measured by bladder pressure.

Causes :

- Bowel obstruction.
- Massive burns.
- Massine ascites.

Definitions :

- Intra-abdominal hypertension (IAH) :
  Sustained/repeated pathological ↑in IAP > 12 mmHg.
- ACS : Sustained ↑IAP ≥ 20mmHg + New organ dysfunction.

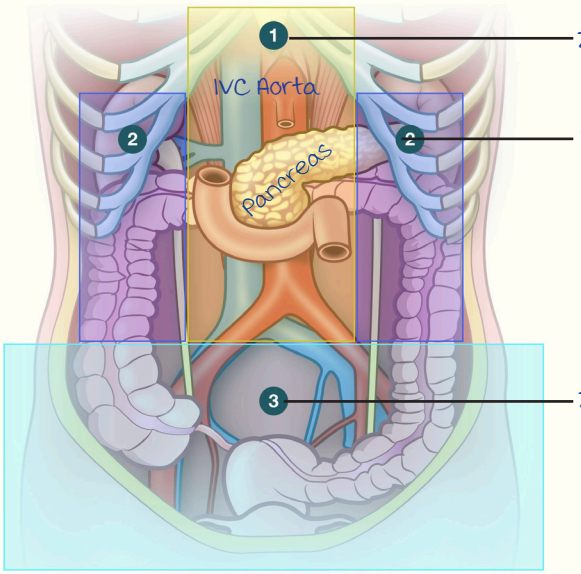
Clinical features :

1. Renal : Renal vessels compressed → ↓GFR → ↓urine output.
2. Cardiac : ↓BP, ↑HR (D/t ↓ venous return).
3. Respiratory : ↑RR, ↓Lung volumes.
4. Intracranial : ↑ in intracranial tension.

Management : Decompressive laparotomy.

RETROPERITONEAL TRAUMA

----- Active space -----



Zone 1 : Major vessels (maximum mortality)

Zone 2 : Kidney, Ureter, renal vessels

IOC → Stable : CECT.

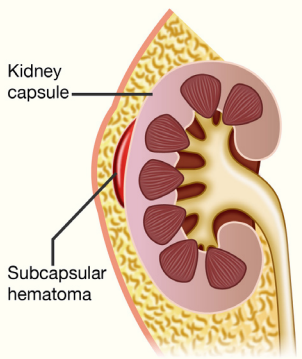
IOC → Unstable : Single shot IVU.

Zone 3 : Pelvic structures (m/c injured zone, Majority : Conservative mx)

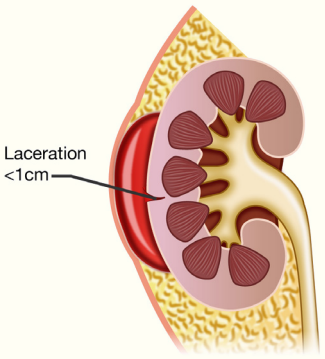
Zones of retroperitoneal trauma

RENAL TRAUMA

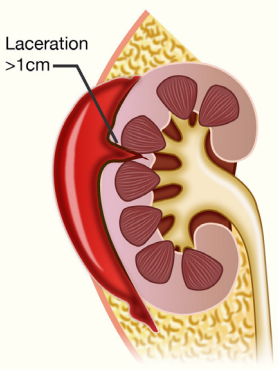
Grades and management :



Grade I



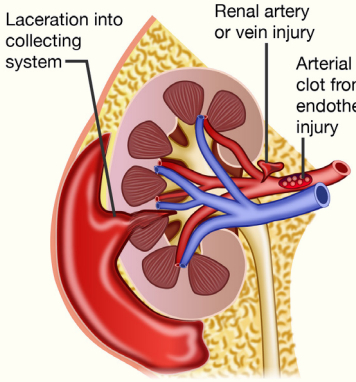
Grade II



Grade III

Mx : Stable → Yes → CECT, monitoring.

Mx : Stable → No → Sx intervention.



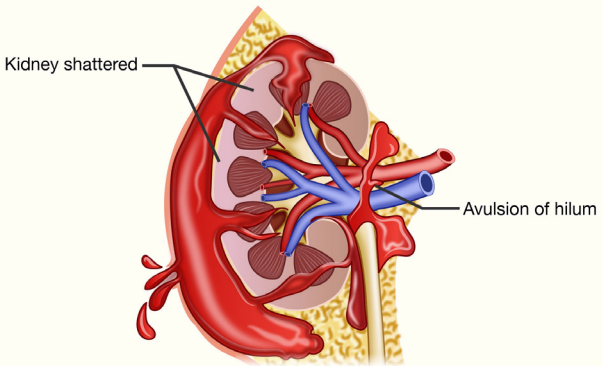
Grade IV

Urinary leak → Urinoma → Sterile → Mx : wait to resolve → Fails → DJ stenting.

Urinoma → Infected → Mx : Pigtail catheter.

Vascular injury → Pulsatile retroperitoneal hematoma → Non-visualization of Kidney → Mx : Sx exploration + repair.

----- Active space -----



Mx : Nephrectomy (Partial/total)

Grade V

Complications of renal trauma :

1. Hematuria.
2. Urinoma (IVU : Dye used → Collected outside kidney).
3. Arterio venous fistula.
4. Renal artery thrombosis → Renal infarct.
5. Meteorism : Gut distension d/t pressure over splanchnic nerves (48–72 hours after renal trauma).

Thoracic Trauma

00:44:19

- Common in polytrauma patients.
- Majority can be managed conservatively.
- M/c cause of death in blunt thoracic trauma : Tracheo bronchial injury.
- M/c cause of death in penetrating thoracic trauma : Pulmonary laceration → Haemothorax.

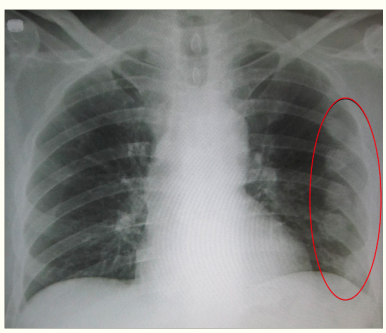
Ix : eFAST can be used.

Rib Fractures :

- M/c type of thoracic trauma.
- M/c ribs # during CPR: 3–5th ribs.

Rib #	Injured structures
1st rib (D/t high impact)	Subclavian vessels, brachial plexus, apex of lung
10th–12th ribs (Floating ribs)	Right → liver, Left → Spleen

Mx : Analgesia.



callus formation over rib #

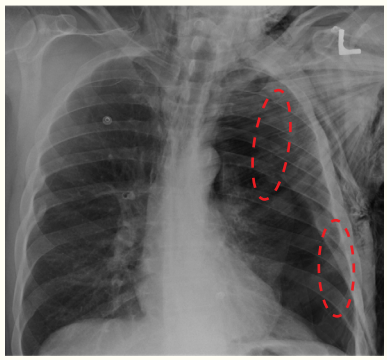
Flail Chest :

Fracture of ≥ 2 consecutive ribs at ≥ 2 places.

Complications :

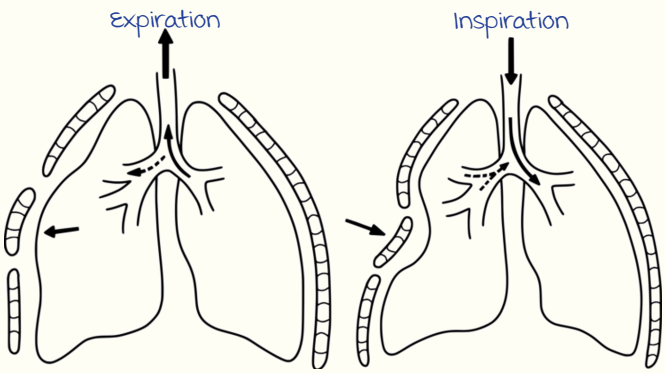
Pulmonary contusion (m/c cause of death).

C/f : Paradoxical chest wall movement.

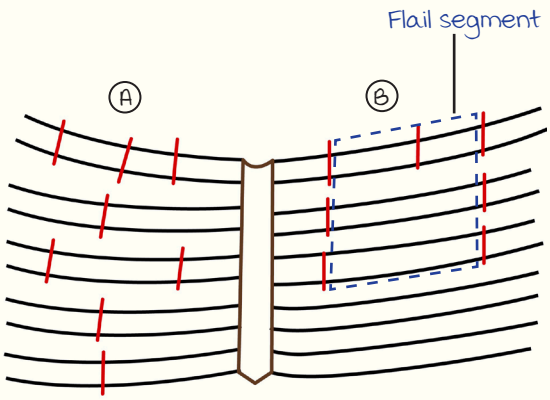


Flail chest

----- Active space -----



Paradoxical chest wall movement



A : Multiple rib # B : Flail chest

Mx :

O_2 + Analgesia → (If insufficient: RR> 20 cpm/ pO_2 < 60 mmHg) → IPPV (Intermittent positive pressure ventilation) → (Insufficient) → Surgical fixation.

PNEUMOTHORAX

Hemodynamic status :

- Stable : Simple pneumothorax.
- Unstable : Tension pneumothorax.

Tension Pneumothorax :

Pathophysiology : Stab injury → Open, sucking wound (One way valve)

↓

Affected lung : Collapsed
Opposite lung : Hyperinflated

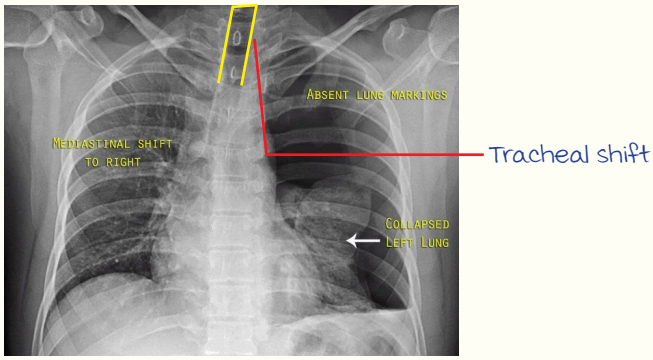
↓ mins/hours

Tracheal shift (Opposite side).
Heart compressed.

----- Active space -----

Clinical features :

- ↑RR.
- ↓Cardiac output.
- ↓Systolic BP, tachycardia ⊕.
- JVP↑.



CXR : Left pneumothorax

Tension pneumothorax v/s differentials :

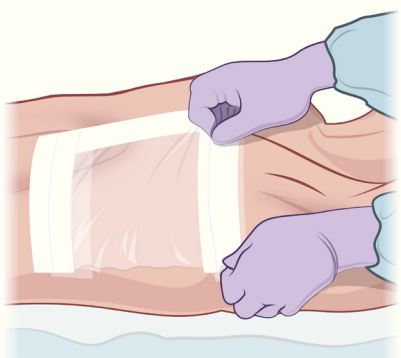
	Tension pneumothorax	Cardiac Tamponade	Hemothorax	Simple pneumothorax
Clinical features	↑ RR, ↑ HR, ↓ BP			No hemodynamic compromise
JVP	↑		–	–
Breath sounds	⊖	Ⓝ	⊖	⊖
Percussion note	Hyperresonant	Ⓝ	Dull	Hyperresonant
Cardiac sounds	Ⓝ	muffled	Ⓝ	Ⓝ

Investigations :

1. Chest X-ray : Absent lung markings, mediastinal shift, collapsed lung ⊕.
2. eFAST : Loss of seashore/barcode/stratosphere sign in M mode.

Management :

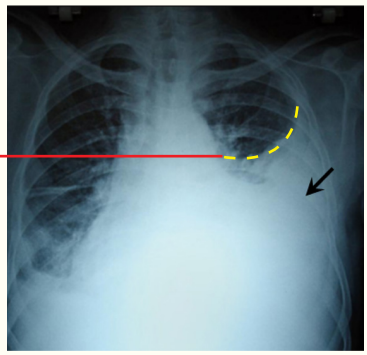
- Emergency : Needle thoracocentesis.
  - Adults : 5th I/C space, mid axillary line.
  - Children : 2nd I/C space, mid clavicular line.
- Definitive : Tube thoracocentesis.
  - Chest tube in triangle of safety.
  - Cover sucking wound :
    3 sided occlusive dressing (Reverses flow of one way valve).



3 sided occlusive dressing

HAEMOTHORAX

Trauma ⟶ Blood accumulation in pleural space.



CXR : Left hemothorax

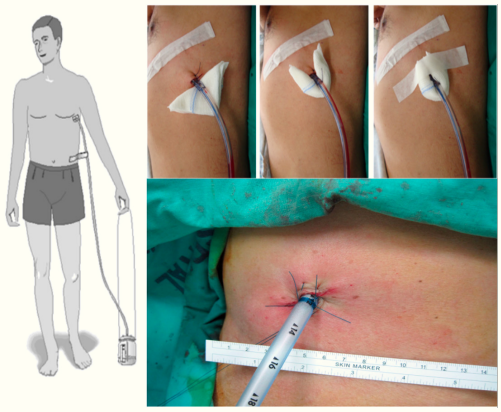
Clinical features :

- ↓ SBP, ↑ HR.
- ↓ Cardiac output.
- Percussion : Dull note.
- Breath sounds (−).

Mx : Chest tube insertion.

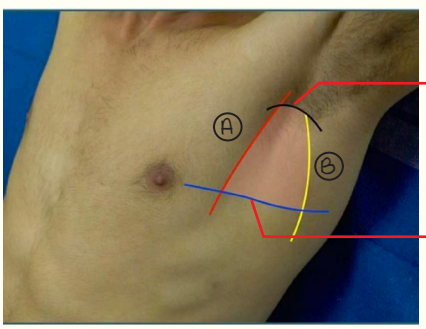
Indications for Emergency Thoracotomy in Thoracic Trauma :

1. >1–1.5 litres blood at insertion.
2. >200 cc/hr for 3 consecutive hours.
3. Cardiac tamponade.
4. Tracheobronchial injury.
5. Thoracic aortic injury.


Chest tube insertion : Upper border of rib
(Never lower border d/t Neurovascular bundle (+))

CHEST TUBES

Triangle of safety :



Ⓐ : Anterior axillary line
Ⓑ : mid axillary line posteriorly

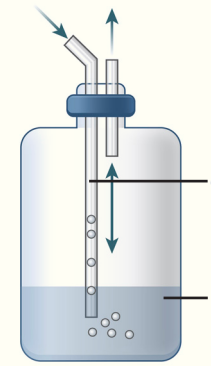
Structures pierced :

1. Skin.
2. Superficial fascia.
3. Deep fascia.
4. Serratus anterior.
5. 3 layers of intercostal muscles.
6. Endothoracic fascia.
7. Parietal pleura.

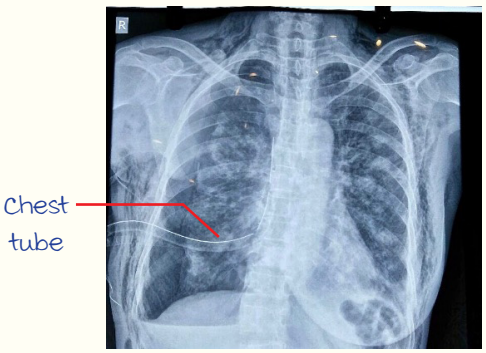
----- Active space -----

Chest Tube Functioning :

- Connected to underwater seal bag.
- Functioning assessed : Water column movement in chest tube (Every breath).



Under water seal



Chest X-ray confirming tube position

Chest Tube Removed :

When lung is expanded → Breath sounds ⊕.
→ Chest X-ray Ⓝ.

- Output < 100 cc in 24 hours.
- Removed when patient is holding breath (At the peak of inspiration).

CARDIAC TAMPONADE

- Rapid blood accumulation in pericardial space.
- m/c with penetrating injury.

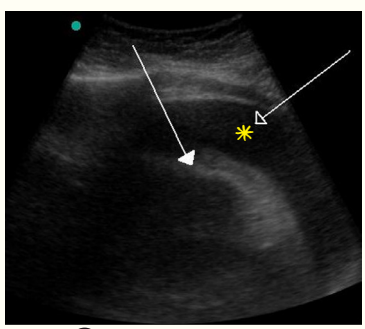
Clinical features : Beck's triad.

Investigations : FAST/eFAST.

Beck's triad
• muffled heart sounds
• ↑ JVP
• ↓ BP

Mx :

- Emergency thoracotomy (Left antero lateral) or sternotomy :
  Evacuation of hematoma + myocardium repair.
- No role for needle pericardiocentesis in traumatic cardiac tamponade.

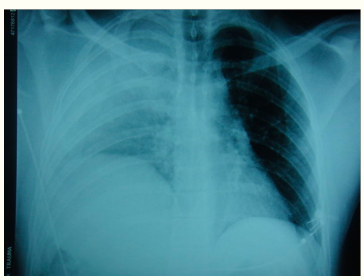

FAST ⊕ : Hypoechoic collection

DIAPHRAGMATIC INJURIES

- m/c : Left > Right (Protected by liver).

C/f :

- Breathlessness.
- Bowel sounds ⊕ in thoracic cavity.
- Coiling of Ryle's tube in thoracic cavity.


Rt diaphragmatic injury (rare)

Mx :

----- Active space -----

- Laparotomy → Reduce bowel contents → Repair diaphragm (Prolene sutures) → Chest tube insertion.
- Avoid blind chest tube insertion d/t risk of bowel injury.

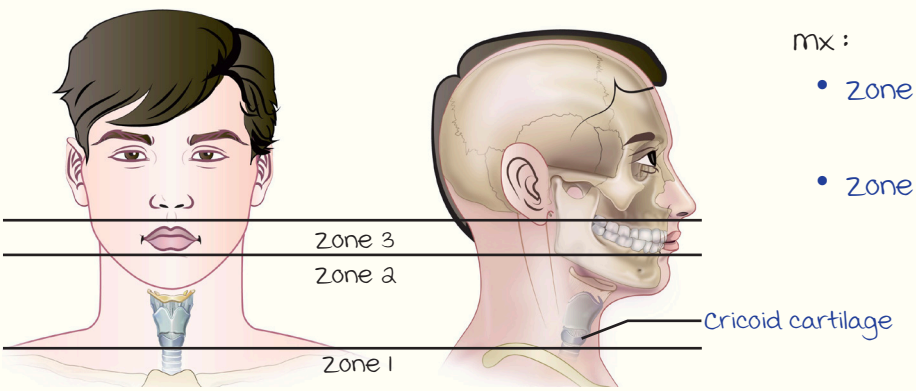
Neck Trauma

01:00:32

Zones :

- Zone 1 : Thoracic inlet to cricoid cartilage (maximum mortality).
- Zone 2 : Cricoid to mandible angle.
  - most exposed zone → ↑Surgically accessible.
  - m/c injured zone.
- Zone 3 : Angle of mandible to base of skull.

Hard signs
• Subcutaneous emphysema. • Air bubbling from a penetrating wound. • Expanding neck hematoma. • Hoarseness of voice.



Neck trauma Zones

Mx :

- Zone 1 & 3 → Angiography → Fails
- Zone 2 → Any hard sign ⊕ → Sx exploration.

Head Trauma

01:01:53

Anatomy of Scalp :

1. Skin.
2. Connective tissue : Adherent vessels → ↑Bleeding of lacerations. (Cannot vasoconstrict)
3. Aponeurosis : Sub aponeurotic bleeding → Black eye.
4. Loose areolar tissue : Dangerous area of face → (Retrograde infection via emissary veins) → Cavernous sinus thrombosis.
5. Periosteum.

----- Active space -----

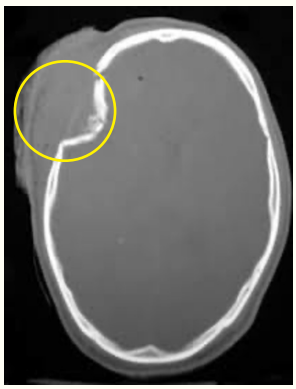
SKULL FRACTURES

Management :

Non-depressed # : No intervention required.

Depressed # :

If focal neurological signs ⊕
or
Depression > Depth of adjacent structures
→ Sx elevation and fixation.

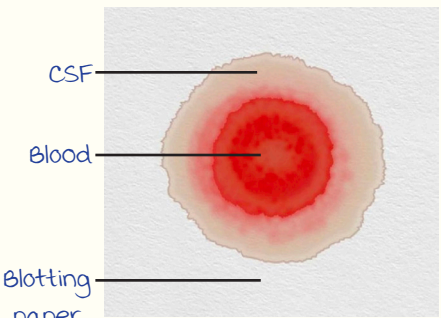


Depressed skull #

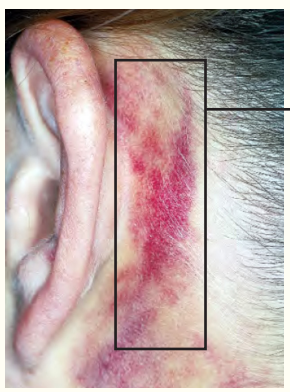
Base of Skull # :

Anterior cranial fossa #	Middle cranial fossa #	Posterior cranial fossa #
Cribriform plate #	Petrous part of temporal bone #	Occipital bone #
Signs : • Black eyes/Racoon eyes • CSF rhinorrhea, epistaxis : Differentiate → Target/Halo sign → CSF : B_a transferrin ⊕ • Anosmia • Frontal lobe contusion	Signs : • Temporal bone contusions • Battle sign (Classical) • Hemotympanum • CSF otorrhea • Facial nerve injury • Paradoxical rhinorrhea (Rare) : Middle ear collection ↓ Eustachian tube Nose	Signs : • Visual problems • occipital contusion • 6th nerve injury • Vernet/Jugular foramen syndrome : 9–11th cranial nerve injury

Racoon eyes



Target/Halo sign in CSF rhinorrhoea



Battle sign

Management (NICE Guidelines) :

IOC in head injury : NCCT.

1. All patients with cervical spine injury : Suspect head injury.
2. Frequency of GCS monitoring :
   - First 2 hours : Every 1/2 hour.
   - Next 4 hours : Every 1 hour.
   - After 6 hours : Every 2 hours.

----- Active space -----

3. CT within 1 hour :
   - With involvement of neurosurgeon :
     - LOC ⊕.
     - Seizures.
     - >1 episode of vomiting.
     - ENT bleed.
     - Focal neurological signs.
     - Penetrating CNS injuries.
   - Without involvement of neurosurgeon :
     - GCS <13.
     - GCS <15 at 2 hours of admission.
4. CT within 8 hours :
   - Age > 65 years.
   - Coagulopathy.
   - Retrograde amnesia > 30 minutes.

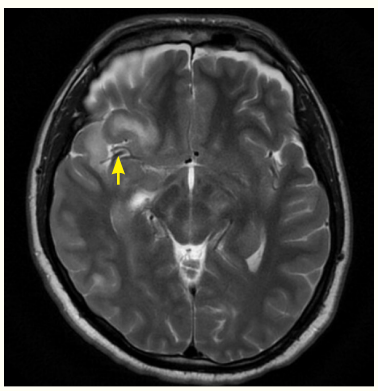
BRAIN INJURY

Types :

- 1° injury : Due to impact.
- 2° injury : Due to ↑intracranial pressure (ICP).

1° Brain Injury :

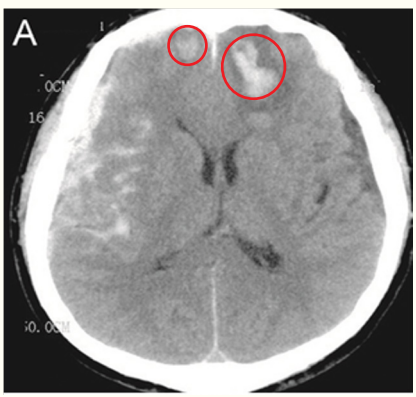
1. Concussion :
   - Mildest type of 1° Brain injury.
   - Mx : Avoid contact sports for short duration (No surgical intervention).
2. Diffuse axonal injury (DAI).
3. Intracranial hemorrhages :
   a. Intra parenchymal hemorrhage/contusion :
      - m/c type.
      - Mx : Conservative (manage ↑ ICP).
   b. Extradural hematoma (EDH).
   c. Subdural hematoma (SDH) :
      Types → Acute : Present in few hours of injury.
      → Subacute : Few hours to days of injury.
      → Chronic : Days to weeks of injury.



MRI : Punctate hemorrhages (DAI)

----- Active space -----

	EDH	Chronic SDH	Diffuse axonal injury
History	Young patient	Elderly patient	Any trauma patients (most severe)
Cause	• High velocity impact → middle meningeal artery rupture • m/c site : Pterion/temporal region	• Trivial injury (Venous bleed) • Not restricted by sutures	• High velocity impact. • D/t shearing force between grey & white matter
Features	Lucid interval	Gradual altered sensorium	Coma (GCS not improving, no signs of recovery)
Imaging	NCCT (IOC) : Bi convex hemorrhage.	NCCT : Concavo convex/ crescentic hemorrhage	• NCCT : Normal • IOC : MRI (Punctate hemorrhages at grey & white matter junction)
Rx	Burr hole/craniotomy	Burr hole/craniotomy	Worst prognosis



CT : Contusion


CT : Biconvex/Lens shape (EDH)

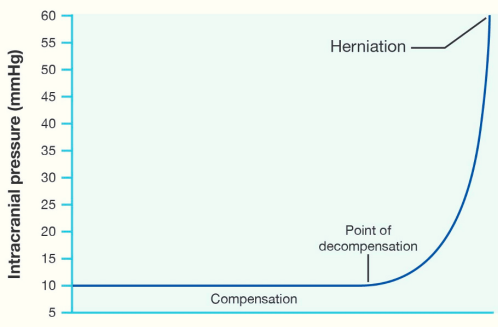

CT : Concavo-convex/ Cresentric SDH

- Indications for craniotomy :
  - >30 cc clot size.
  - >5 mm midline shift.
  - >1.5 cm clot thickness.


Pterion : Preferred site for craniotomy

2° Brain Injury :

- Occurs due to ↑ICP.
- Cerebral perfusion pressure (CPP) :
  - CPP = MAP − ICP (Normal = >60 mmHg).
  - Trauma → ↑ ICP → ↑ MAP : Cushing's reflex (↓HR, ↑BP, Altered respiration).



Intracranial volume pressure curve

Mx of ↑ICT :

- Adequate O_2.
- Adequate perfusion (SBP >100 mmHg).
- Avoid hyperglycemia (↑ cerebral oedema).
- Administer IV mannitol.
- hyperventilation (moderate amount).
- No steroids in head trauma.

Goals of Rx
• ICP 20 – 25 mmHg
• CPP ≥ 60 mmHg
• Na^+ : 135 – 145
• SBP ≥ 100 mmHg

----- Active space -----

Note : Seizure prophylaxis (Phenytoin/valproate).

- Not recommended for late post-traumatic seizures (PTS).
- Useful for early PTS.

GLASGOW OUTCOME SCORE

Prognostic score following head injury.

Score	Prognosis
1	Death
2	Persistent vegetative state
3	Severe disability + conscious
4	Moderate disability
5	Good recovery

BRAIN DEATH

2 experts required to certify brain death.

Criteria to declare brain death :

- GCS = 3.
- Non-reactive pupils.
- Absent brainstem reflexes.
- No spontaneous ventilatory effort.
- Absence of confounding factors (Alcohol, drug intoxication, hypothermia).

Thermal Injury 01:21:03

BURNS

Referral criteria to a burns unit :

- Burns involving face, hands, feet, genitalia, perineum, major joints.
- Chemical burns.
- Electrical burns
- Inhalational injury.
- Partial thickness burns : > 10% of total body surface area (TBSA).
- Third degree (Full thickness) burns in any age group.

----- Active space -----

Initial Management :

ABCDE : Airway, Breathing, Circulation, Disability, Exposure (Extent/cause).

Airway :

1. Signs of airway burns :
   - Burnt/singed nasal hair (most significant)
   - Hoarseness of voice
   - Carbonaceous deposits in sputum
   - Closed room burns
   - Burns involving head, face, neck
   - Altered mental sensorium

   Any ⊕ → Prophylactic intubation (Prevent airway collapse).

2. stages of airway injury following burns :
   1. Acute pulmonary insufficiency (Breathlessness, ↓SPO_2 : D/t CO build up).
   2. ARDS like picture (Hypoxia, B/L lung infiltrates ⊕).
   3. Bronchopneumonia (D/t ↓ immunity)
      - Early (1–3 days) : Staphylococcus.
      - Late (>3 days) : Gram ⊖ bacteria.

Breathing : Hypoxia, CO poisoning, eschar (Thickened tissue) around chest.

Circulation :

- Inflammatory response → Localised : Burns < 10% TBSA.
  → Generalised : Burns > 10% TBSA.
- Vasodilatation + leaky capillaries → Dehydration.
  → Edema/3rd space loss.

Burns resuscitation : IV fluid replacement.

1. Crystalloid resuscitation formulae :
   - Old Parkland's formula = 4 x Body weight (kg) x TBSA burned.

     Fluid in 24 hours → First 1/2 amount : 1st 8 hours.
     → Next 1/2 : next 16 hours.
   - Galveston formula (Used in paediatric burns).
   - Latest formulas :

LR : Lactated Ringer's

Category of burns	Age & weight	Adjusted fluid rates	Urine output
Flame or scald	Adults & older children (≥ 14 years).	2 ml LR x Kg x % TBSA	0.5 ml/kg
	Children (≤ 14 years)	3 ml LR x Kg x % TBSA	30–50 ml/hour
	Infants & young children (≤ 30 kg)	3 ml LR x Kg x % TBSA + solution with sugar at maintenance rate	1 ml/kg/hour
Electrical injuries (3rd/4th grade)	All ages	4 ml LR x Kg x % TBSA until urine clears	1–1.5 ml/kg/hour until urine clears

2. Colloid resuscitation formula :
   - m/c : Muir and Barclay formula.
   - Colloids : Given after 1st 12 hours (To ↓ risk of edema).

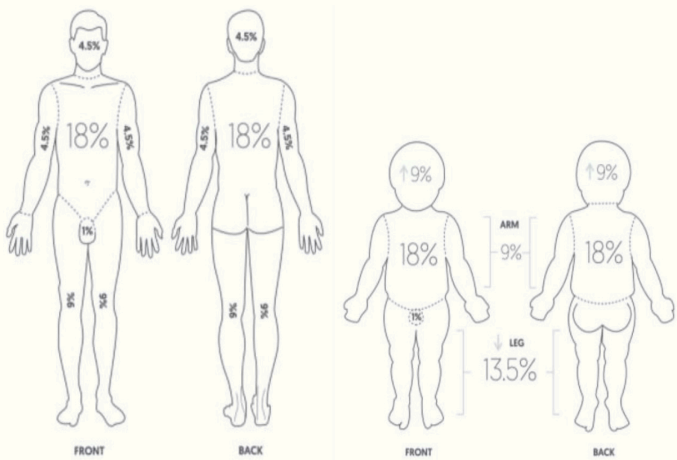
----- Active space -----

Calculating TBSA :

- Wallace rule of 9.
- Lund and Browder chart (Best).

Zones of Burns :

- Zone of coagulation/necrosis : Irreversible, non salvageable.
- Zone of stasis → Infected / Well managed
- Zone of hyperemia : Vasodilatation, salvageable.



Adults Children

Wallace rule of 9

Degree of Burns :

	First degree burns	Second degree burns		Third & fourth degree burns
		Superficial	Deep	
Layer	Only epidermis	Epidermis & papillary dermis	Epidermis & dermis (Entire)	• 3rd : SC tissue • 4th : Muscle
Wound	Red, tender	• Red, tender • Blister formation	Red, less tender	• Black & charred • Painless
Blanching	Present	Present	Some area only	Absent
Rx	Heal without scarring in 3 – 5 days	Heals after application of dressing materials without scarring	Heals with hypertrophic scars and keloids	Early excision → STSG (Split thickness skin grafting)

----- Active space -----

2nd degree superficial burns


2nd degree : Deep burns


Hypertrophic scars


Desquamation → Depigmentation → Healing


3rd and 4th degree burns

Burns Management :

- ABCDE.
- Wash : Given with room temperature water.
- Do not burst blisters.
- IV fluids.
- Avoid : IM and s/c injections.
- NG tube if > 15% TBSA burned (D/t possibility of ileus).


Split thickness skin grafting (STSG) after debridement

Nutrition in Burns :

- Basal energy expenditure (BEE/REE) is increased in patients with burns.
- Severe burns : 40 Kcal/Kg/day (2x normal).

- Max nitrogen loss : Day 5 to 10 (Atleast 20% calories should be from proteins).

Davies formula used to calculate protein requirement :

i. Children : 3 g/kg + 1 g% TBSA.

ii. Adults : 1 g/kg + 3 g% TBSA.

----- Active space -----

Escharotomy :

Eschar (Thickened tissue post burns) → Compartment syndrome (Pressure : > 30 mmHg) → ↑↑pain → Escharotomy.

- Deep fascia is cut and muscle released.
- Wound extended beyond deep burn.
- Any significant bleeding vessels : Diathermy.
- Post-op hemostatic dressing + Limb elevation.

Dressing Materials for Burns Mx :

Aim :

- Protect damaged epithelium.
- minimize bacterial/fungal contamination.

Degree	Dressing used
1st degree	No dressing required, expose the wound
2nd degree : Superficial	• Vaseline/Paraffin gauze • Collagen dressing (If non infected)
2nd degree : Deep	Collagen dressing, Hydrocolloid dressing (Duoderm)

Special agents :

1. Silver sulphadiazine (1%) : M/c agent.
   Frequent change of dressing required
2. Silver nitrate :
   Stains everything black (Not useful).

- Good action against pseudomonas & Gram ⊖ bacteria.
- Does not penetrate eschar.

3. mafenide acetate (5%) : Penetrates eschar.
   Problems : Painful application & metabolic acidosis.
4. Cerium nitrate (Best agent).

Causes of Death in Burns :

- Immediate : Asphyxia > Neurogenic shock
- Early (1-3 days) : Hypovolemic shock.
- Late (> 3 days) : Septic shock
- Overall : Septic shock (m/c organism : Pseudomonas).

----- Active space -----

Special Situations :

a) Acid/alkali burns :

- more severe : Alkali burns (Liquefactive necrosis, deeper penetration).
- Never neutralise (To avoid ↑ in burnt area).
- Wash with water, brush off chemical powder.

b) Hydroflouric acid burns :

- ↑S. K^+, ↓s. Ca^{2+}, ↓ pH (Acidosis), Arrythmias (Cause of death).
- mx : Calcium gluconate.

c) Electrical burns : High degree burns.

- Alternating current → Arrythmias (Death).
  → Tetany (myoglobinuria).
- Examine : Entry and exit burn.
- mx : IV fluids → ↑Urine output → Prevent tubular necrosis d/t myoglobinuria. (Old Parkland's formula)

HYPOTHERMIA

- Rectal temperature : Best to measure core temperature.
- Cardiopulmonary bypass machine : Best way to warm severely hypothermic patients.

Frost Bite and Trench Foot :

Frost bite	Trench foot
• Prolonged exposure to dry cold • Ice crystals formed in tissue ↓ Membrane damage + Microvascular damage • Rewarming → Re-perfusion injury	• Prolonged exposure to cold + moisture, tissue : wet ↓ • Microvascular damage • Stasis & occlusion

mx of frost bite and trench foot :

- Rapid re-warming of leg (Water : 40°).
- Do not rub the tissues (Pain ++).
- Beware of re-perfusion injury.
- Hyperkalemia, acidosis can occur.
- If gangrene → Wait for demarcation line → Amputation.

HERNIA, THORAX AND SKIN

----- Active space -----

Hernia and Hernia Surgeries

00:00:52

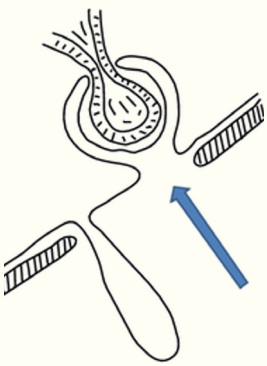
Types of Hernia :

	Simple/Uncomplicated	Obstructed	Strangulated
Hernia	Reducible	Irreducible	Obstructed hernia + compromised blood supply + skin inflamed
Cough impulse	⊕	⊖	⊖
Forceful taxis (Hernia reduction)	Possible	C/I d/t reduction en masse. (Reduction of contents + constriction ring causing obstruction.)	

Strangulated hernia

Contents of Hernia :

	Omentocele	Enterocele
Peristalsis	⊖	⊕
Consistency	Doughy	-
Reducing 1st part	Easy	Difficult
Percussion note	Dull	Tympanic



Reduction en masse

HERNIA SURGERY

	Herniotomy	Herniorraphy	Hernioplasty
Procedure	Identify sac → Cut open + reduce contents.		
Defect	Not repaired	Edges sutured together (No mesh d/t infection risk)	Closed with mesh
Recurrence rate	Highest	-	Least
Performed in	TOC in : • Congenital inguinal hernia • Inguinal hernia in children • Congenital hydrocele	obstructed and strangulated hernia	For all other hernias

Mesh :

Best material of mesh :

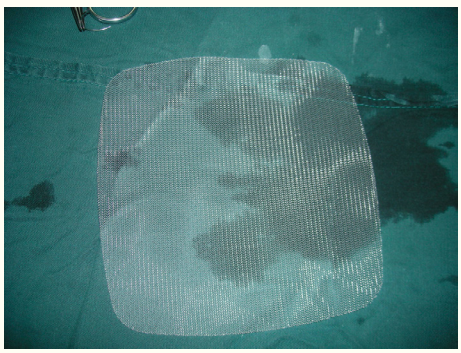
- Low weight → Less shrinkage.
- Thin fibres.
- Large pores.

Placement :

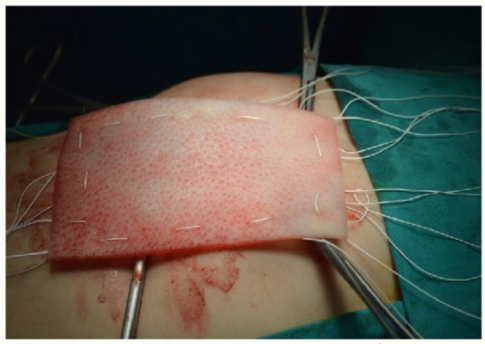
At least 2 cm overlap all around the defect (To avoid recurrence).

----- Active space -----

Mesh materials	
Synthetic	Biological
Avoid in infection & strangulation	Can be used in infection
Eg. : • Prolene • Vipro • PTFE (Intraperitoneally) } Not used intraperitoneally d/t bowel adhesions.	Eg. : • Acellular human dermis (Alloderm) • Acellular porcine dermis



Synthetic (Prolene) mesh



Biological mesh (Alloderm)

Inguinal Hernia

00:06:16

- m/c type of hernia.
- m/c type of inguinal hernia
- m/c hernia in females

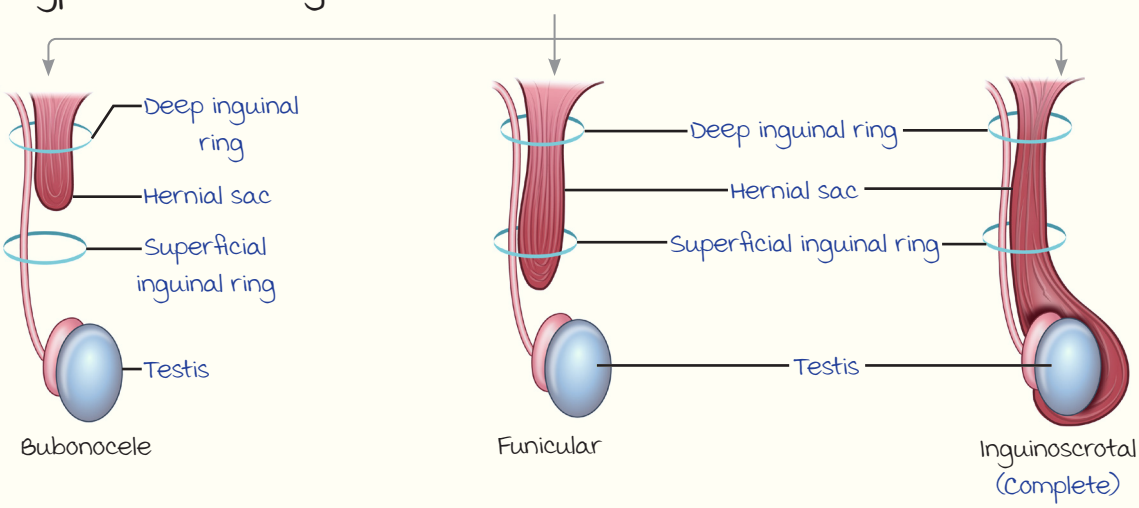
→ Indirect inguinal hernia.

Note : Femoral hernia is F >> M

Clinical tests :

- Deep ring occlusion test : Single best test.
- Zieman's three finger test, ring invagination test : Low sensitivity.

Types of Indirect Inguinal Hernia :

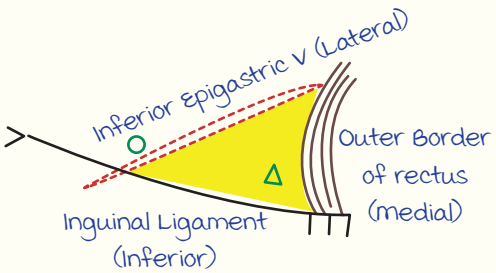


----- Active space -----

INGUINAL HERNIA ANATOMY

Hesselbach's Triangle (HT) :

Key :
- V : vessels
- ○ : Indirect hernial (Lateral to HT)
- △ : Direct hernia (Through HT)



Boundaries

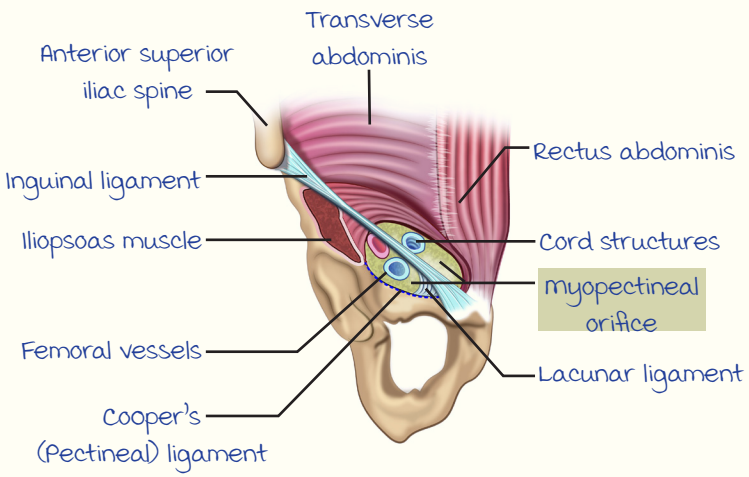
Note :

	Modification of
Deep ring	Fascia transversalis
Superficial ring	External oblique aponeurosis

Myopectineal Orifice of Fruchaud :

Boundaries :
- Superior : Arching fibres of internal oblique
- Inferior : Pectineal/Cooper's ligament.
- Lateral Tendon of iliopsoas.
- Medial : Outer border of rectus.

Significance :
Mesh placement in orifice covers defect of inguinal, femoral & obturator hernia.



Myopectineal orifice of Fruchaud

Hernioplasty

00:08:36

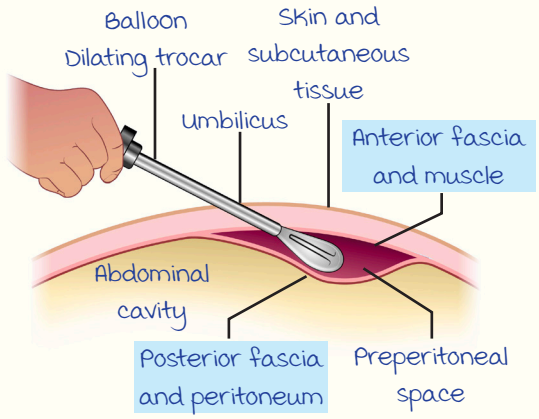
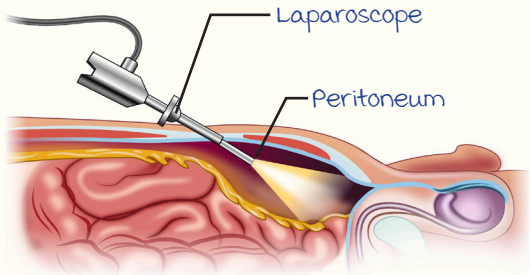
Open Sx :

Lichtenstein's tension free mesh hernioplasty

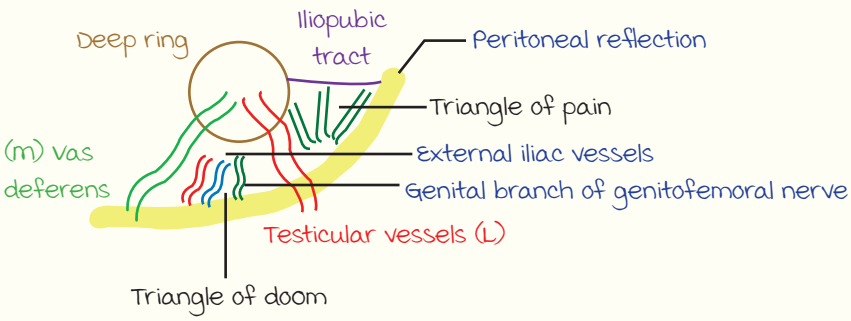
Complications of open inguinal hernia Sx :
1. Hemorrhage.
2. Injury to vas/cord structures.
3. m/c nerve → Injured at superficial ring : Ilioinguinal nerve.
   → Entrapped below mesh : Iliohypogastric nerve → Chronic inguinal pain.
4. Recurrence.
5. Wound infections.

----- Active space -----

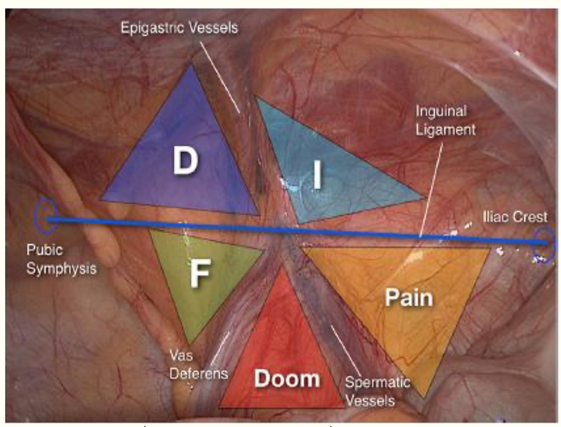
Laparoscopic Inguinal Sx :

TEP	TAPP
Total Extraperitoneal repair	Trans Abdominal Preperitoneal repair
Peritoneum remains intact	Peritoneum breached → mesh placed
Technically more challenging, better repair 	

Structures Encountered During Sx :



Key : L → Lateral ; M → Medial



Δ of doom and Δ of pain

		Triangle of Doom	Triangle of Pain
Boundries	Medial	Vas deferens	Testicular vessels
	Lateral	Testicular vessels	Peritoneal reflection
	Inferior	Peritoneal reflection	-
	Superior	-	Iliopubic tract
Contents		a. External iliac artery b. External iliac vein c. Genital branch of genitofemoral nerve	a. Lateral cutaneous nerve of thigh b. Femoral nerve c. Femoral branch of genitofemoral nerve
Complication		Torrential bleeding : If stapler/tacker applied	Meralgia paresthetica : Shooting pain along lateral aspect of thigh d/t entrapment of lateral cutaneous nerve of thigh (m/c)

Corona mortis (Circle of death) :

----- Active space -----

- Abnormal communication b/w obturator and iliac vessels.
- Injury → Torrential bleeding.

Note : Special types of inguinal hernia

Sliding hernia	Sportsman hernia
• Posterior boundary formed by visceral structure (m/c : Sigmoid colon) • Visceral structure can get injured during sac dissection • Seen in elderly males • Left >> Right	• AKA Gilmore's groin • m/c seen in athletes • Tear in posterior wall muscle ↓ Extreme pain (+) • Sac not palpable (Small sac) • IOC : MRI • Sx : Laparoscopic repair

Classification of Hernia

00:12:33

European Hernia Society Classification :

Inguinal hernia :

- Defect measured by size of finger breadth.
- Classified as → 1°/recurrent.
  → Location : Lateral, medial, femoral.

1°/Recurrent
• Lateral/Indirect hernia • Medial/Direct hernia • Femoral hernia

Ventral hernia :

Hernia	Characteristics	Term
Medial	Subxiphoid	M1
	Epigastric	M2
	Umbilical	M3
	Infraumbilical	M4
	Suprapubic	M5
Lateral	Subcostal	L1
	Femoral	L2
	Iliac	L3
	Lumbar	L4

Nyhus Classification for Inguinal Hernias :

Type	Description
1	Indirect inguinal hernia + Normal ring
2	Indirect inguinal hernia + Enlarged ring
3a	Direct hernia + Posterior floor defect
3b	Indirect hernia + Posterior floor defect (Pantaloon hernia)
3c	Femoral hernia
4	Recurrent hernia

----- Active space -----

Other Hernias

00:13:49

FEMORAL HERNIA

- Through femoral ring (Small defect).
- F >> M.
- ↑Risk of strangulation/obstruction (Ring can not dilate).
- Richter's hernia can be seen.

Bounded by
• Superiorly : Inguinal ligament
• Medially : Lacunar ligament
• Inferiorly : Pectineal/Cooper's Ligament

On examination :

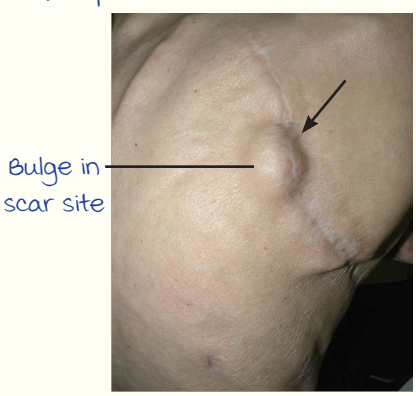
	Inguinal hernia	Femoral hernia
Pubic tubercle	Above and medial	Below and lateral

D/D : Inguinal hernia, Psoas abscess, Inguinal lymph node, saphena varix

Mx → Open Sx.
→ Laparoscopic hernioplasty (M/C).

VENTRAL/ABDOMINAL WALL HERNIAS

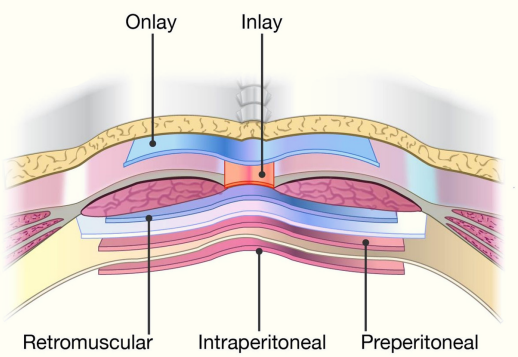
- Epigastric hernia.
- Umbilical hernia.
- Paraumbilical hernia.
- Traumatic hernia.
- Spigelian hernia.
- Lumbar hernia.
- Parastomal hernia.
- Incisional hernia (M/C).



Incisional hernia

Hernioplasty for ventral hernias :

Onlay	Top of rectus sheath
Inlay	With rectus sheath
Preperitoneal	Above peritoneum
Intraperitoneal	IPOM (M/C) : PTFE mesh
Retromuscular	Behind rectus muscle



	Epigastric hernia	Umbilical hernia	Paraumbilical hernia
Location	Xiphisternum till umbilicus	Through umbilicus	Adjacent to umbilicus
Chances of strangulation	Low	Low (Large defect)	High (Narrow defect)

----- Active space -----

	Epigastric hernia	Umbilical hernia	Paraumbilical hernia
Unique features	• Fatty hernia of linea alba (midline hernia) • Pain similar to peptic ulcers	Umbilicus everted	Umbilicus forms one boundary
Seen in	Young, fit males (Thin, muscular)	Common in newborn (Wait 2–3 yrs for Sx)	-

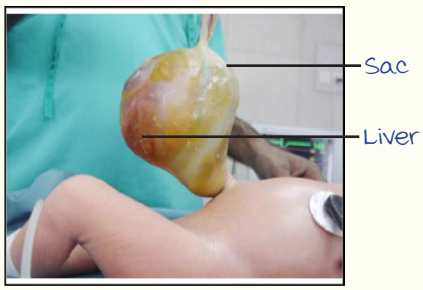

Epigastric hernia


Umbilical hernia


Paraumbilical hernia

Omphalocele vs Gastroschisis :

Omphalocele	Gastroschisis
Defect through umbilicus, bowel fails to return inside	Defect adjacent to umbilicus
Covered with a sac	No sac covering Can get dry, shriveled
Large defects (Liver can also herniate)	Bowel exposed
A/w other congenital defects, Beckwith weidmann sydrome, Trisomy 13, 18, 21	↓ congenital anomalies
-	Atresia, infection/perforation can occur



Omphalocele


Gastroschisis

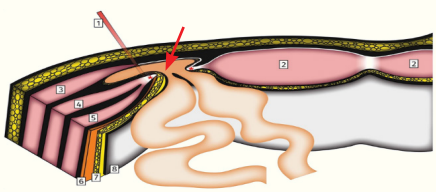
Mx : Sx (Gradual closure → To avoid abdominal compartment syndrome).

Spigelian Hernia (Intra Parietal Hernia) :

- Occurs at outer border of rectus close to spigelion line (mid point between umbilicus and pubic symphysis).
- Lies in between muscle layers

  ↓

  Not palpable outside (Narrow defect).
- Detected only if strangulation ⊕.


Spigelian hernia

----- Active space -----

Obturator Hernia (Little Old Lady's Hernia) :

Seen in elderly, multiparous women.

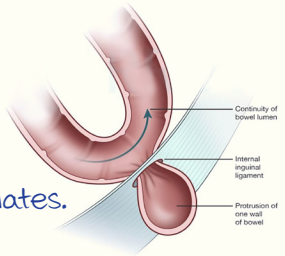
Narrow defect (↑Chances of strangulation/Richter's hernia).

C/f :

- Bowel obstruction, pain.
- Howship romberg sign : Adduction + Internal rotation → Shooting pain along obturator nerve.
- Hannington Kiff sign.

Richter's Hernia :

- Seen in : Femoral hernia > Paraumbilical, obturator hernia.
- Small defect : Only a part of circumference of bowel herniates.



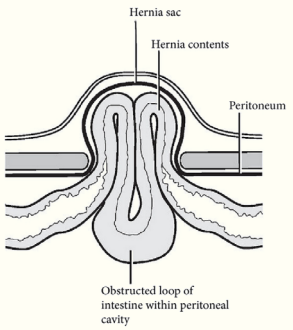
Richter's hernia

C/f :

- 1st sign : Gastroenteritis.
- Strangulation can get missed.

Maydl's Hernia :

- Wide defect.
- 'W' shaped hernia.
- >1 bowel loop herniates
- If strangulation ⊕ : Intraperitoneal part affected first.

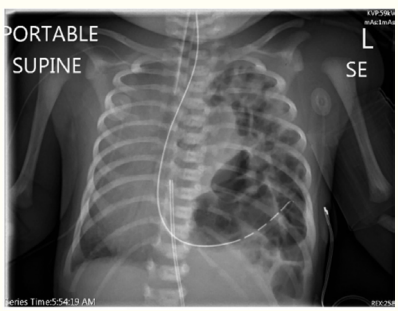


Maydl's hernia

Congenital Diaphragmatic Hernia

00:22:19

Bochdalek hernia	Morgagni hernia
Left posterolateral	Right anteromedial
Defective development of pleuroperitoneal cancel/membrane	Defective central tendon of diaphragm
Structure herniating : Stomach, spleen, transverse colon	Structure herniating : Transverse colon
More common	-



Bochdalek hernia

Ix : Prenatal detection can be done.

Other features :

- m/c cause of death : Pulmonary hypoplasia → Best ventilation : IPPV; Bag and mask ventilation : C/I.
  (Respiratory distress + scaphoid abdomen)
- 2nd m/c cause of death : Pulmonary Hypertension (Mx → Inhaled nitrates)

Management :

Sx : Circular incision around diaphragm → Bowel reduced → Mesh placed.

Thorax

00:24:24 ----- Active space -----

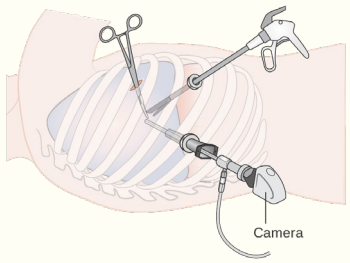
Thoracoscore :

Prognostic score (mortality/morbidity risk after lung resection).

Video Assisted Thoracoscopic Surgery (VATS) :

Used for :

- Resections.
- Decortication.
- Biopsies.



VATS

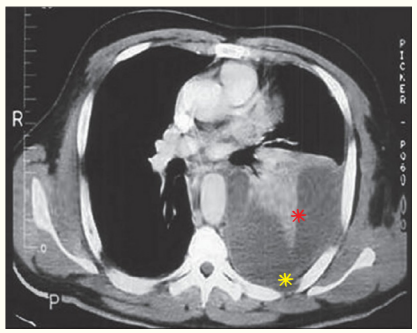
Method : Lung collapsed to create space (using double lumen endotracheal tube).

Empyema :

Pus in pleural space.

Phases :

Exudative	Fibrinopurulent	Organized
• Thick pus, fever • No lung changes	Thickening of pus + pleura	Thickening of pleura, Lung becomes entrapped
mx : Aspiration + Antibiotics	mx : Chest tube (D/t difficult aspiration)	mx : Stripping of pleura/ VATS



Empyema

✳ Fibrosis ✳ Pus

Lung Cancer

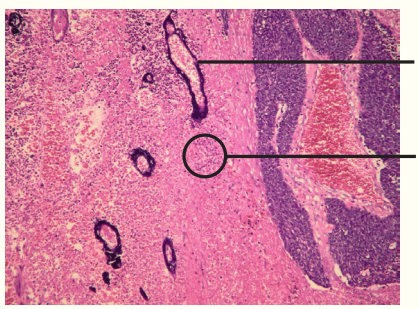
00:26:38

Risk Factors :

- Smoking.
- Pollution.
- Asbestos exposure.

Small Cell/Oat Cell Carcinoma :

- Strongest a/w smoking.
- M > F, poor prognosis.
- Highly chemosensitive (Fast growing cancer).
- Maximum Paraneoplastic syndromes ⊕ (Cushing's syndrome, SIADH, acromegaly, various neurological syndromes).



HPE : Small cell carcinoma

----- Active space -----

Non Small Cell Carcinoma :

Squamous cell carcinoma	Adenocarcinoma
• Upper and centrally placed • Strongly a/w smoking • m/c lung cancers in smokers • Leads to hypercalcemia of malignancy (PTHrp related)	• Peripherally placed • F>m ; Slow growing • m/c lung cancer (Overall) • Markers → NAPSIN 4, ALK, RAS

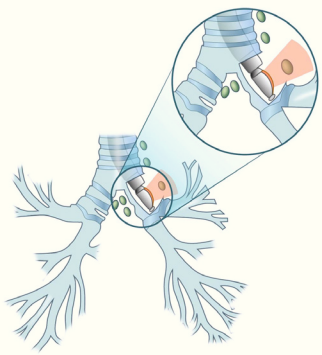
Pancoast tumour

Pancoast Tumour :

- Squamous cell carcinoma → Sympathetic chain compressed → Horner's syndrome (Ptosis, Miosis, Enopthalmos, Anhydrosis).
- mx : Radiotherapy.

Lung Cancer Staging :

TI staging	Tumor size
TIa	<1cm
TIb	1-2cm
TIc	2-3cm



EBUS

Ix :

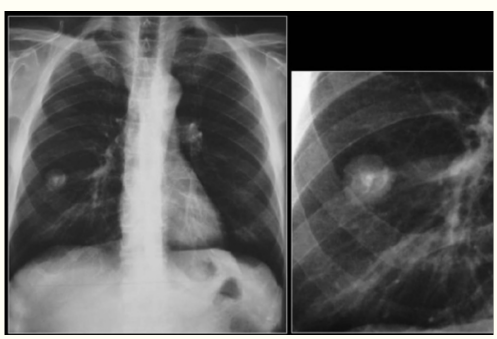
- Biopsy : Endo bronchial ultrasound (EBUS) → FNAC.
- PET-CT : Staging of tumour.

HAMARTOMA

m/c benign tumour of lung.

C/f : Asymptomatic OR cough + hemoptysis.

mx : Excision with VATS.



Hamartoma : Coin shaped lesion

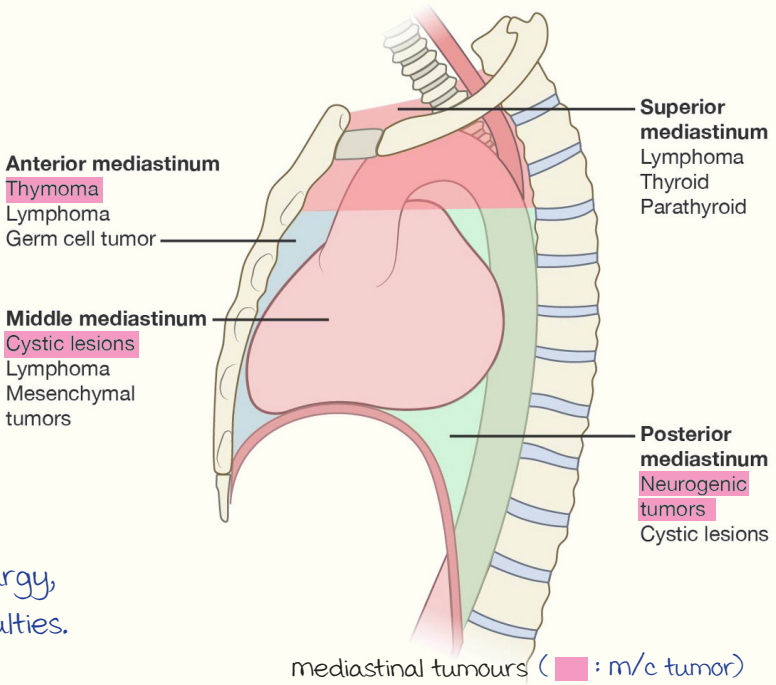
Mediastinal Tumours

00:30:20 ----- Active space -----

MEDIASTINAL TERATOMA

- m/c mediastinal germ cell tumour.
- m/c seen in anterior mediastinum.
- Mature teratoma : A/w Klinefelter's syndrome.

Imaging :
Well defined mixed density lesions (Displacing structures > invading) + Cystic areas + Calcification.



mediastinal tumours (: m/c tumor)

THYMOMA

- A/w myasthenia gravis : weakness/lethargy, breathing difficulties.
- MRI/CT to stage to stage lesions :

Masaoka staging	
Stage	Description
I	Macroscopically completely encapsulated + No capsular invasion.
II	Invading into surrounding structures + Capsular invasion
III	Invading neighbouring organs (Pericardium, great vessels, Lungs)
IVA	Pleural/Pericardial dissemination
IVB	Lymphatogenous/Hematogenous metastasis

Skin

00:32:57

Types of Ulcers :

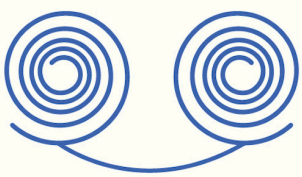
Based on edge Ulcers

Sloping :
- Healing
- Venous

Punched :
- Arterial
- Neuropathic
- Bed sores
- Syphilis

Undermined :
TB

Rolled out pearly white :
BCC (Rodent)



Raised everted cauliflower :
SCC

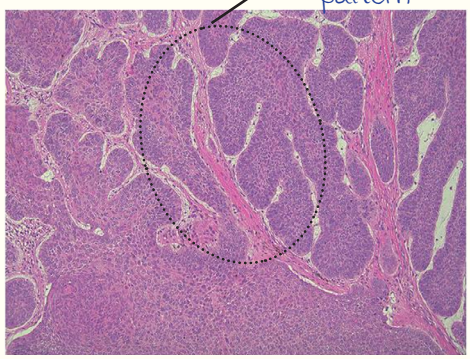
----- Active space -----

Basal Cell Carcinoma :

- AKA Rodent ulcer, locally invasive (Does not metastasize) → Lymph nodes (−).
- m/c seen : Face (Above line joining angle of mouth to ear lobule).

Mx : Wide Local Excision (WLE).

Basal cell carcinoma (BCC)



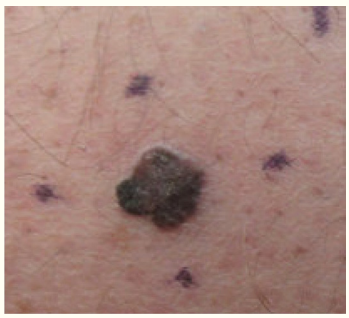
HPE of Basal cell carcinoma

Malignant Melanoma :

Risk factors : UV radiation, white population, familial atypical mole melanoma syndrome.

Types :

Type	Description
Superficial spreading	• m/c in pre-existing mole • Seen in sun exposed areas • Eg : Subungual melanoma
Lentigo maligna	• In situ melanoma in elderly • Best-prognosis
Acral melanoma	m/c in dark skinned patients
Nodular melanoma	• Most aggressive, rapid vertical phase of growth. • Worst prognosis • Amelanotic melanoma : Variant of nodular type



Malignant melanoma

Subungual melanoma
(Hutchinson sign)

Ix :

Biopsy (Confirmatory) : IHC markers

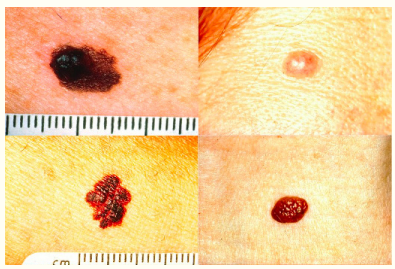
↓

S-100, Melan-A, HMB-45.

ABCDE changes in pre existing mole :

Asymmetry
Borders (Irregular)
Colour change
Diameter becomes >6 mm
Evolution

} Indicates malignant transformation



ABCDE Changes

Staging :

1. Clarke & Breslow : Depends on depth of invasion.
2. TNM staging.

----- Active space -----

Mx : Wide local excision.

Prognostic factor : Lymph node status (Most important).

Marjolin's Ulcer :

- Squamous cell carcinoma in pre existing burns scar/venous ulcer.
- Mx : Surgery (Radiotherapy does not work well).

Marjolin's ulcer

Soft Tissue Sarcoma (STS)

00:36:52

- m/c STS : Liposarcoma.
- m/c STS in children : Rhabdomyosarcoma.
- Common STS in males : Malignant fibrous histiocytoma

C/f : Lump/mass (m/c).

Spread : Hematogenous > Lymphatic (Rare).

- Limbs → Lungs
- Retroperitoneum → Liver

Sarcoma spreading to LN (Exceptions)
Mnemonic : MARCES
• Malignant fibrous histiocytoma • Angiosarcoma • Rhabdomyosarcoma • Clear cell • Epithelial • Synovial
Mx : Lymph node (LN) clearance

Ix :

- Tru-cut/Core biopsy : Confirmatory.
- PET-CT : Staging.

Mx : Wide local excision + Radiotherapy + Chemotherapy.

Prognostic factor : Grade of tumour (Most important).

Desmoid Tumour :

- STS of anterior abdominal wall, seen in site of scar.
- ↑Chances of recurrence.
- A/w Gardner Syndrome.

Mx : Wide local excision.

Desmoid tumour

----- Active space -----

VASCULAR SURGERY

Acute Arterial Occlusion

00:01:23

Features :

- M/c cause : Embolus (M/c source ⟶ Heart).
- H/o ischemic heart disease ; H/o A-fib (Irregularly irregular heart beat).

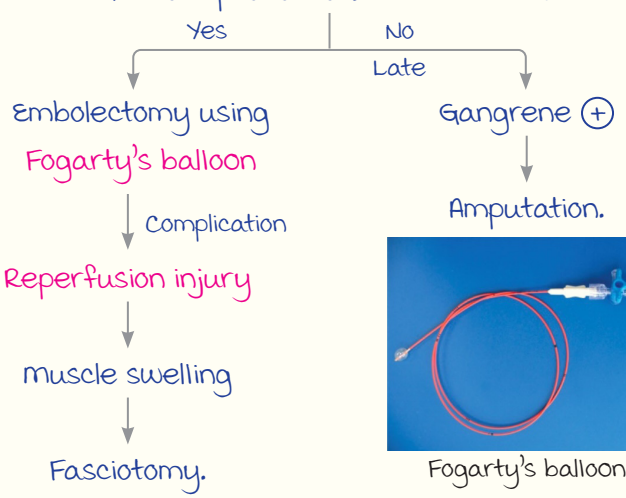
Clinical features (6Ps) :

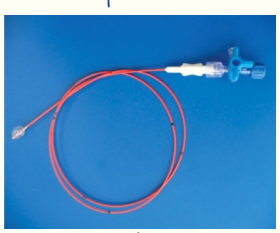
- Pain.
- Pallor.
- Paresthesia.
- Poikilothermia (Cold limbs).
- Pulselessness.
- Paresis/paralysis (Late signs).

Management :

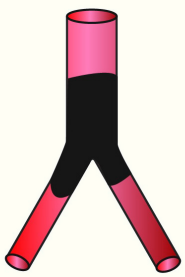
IOC : Doppler/Duplex Scan.

Rx : Patient presented within 6-8 hours

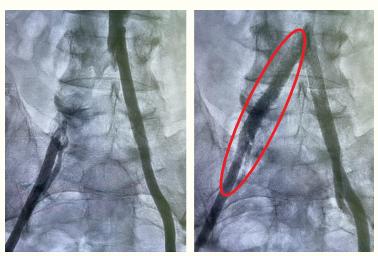




Fogarty's balloon



Acute arterial embolus : No collaterals



Embolectomy angiogram : Revascularisation

Chronic Arterial Occlusion

00:04:17

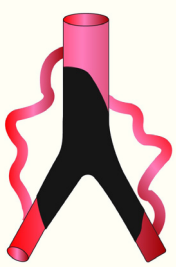
Features :

- Gradual occlusion (D/t thrombus) ⟶ Formation of collaterals.

Clinical Features :

- Intermittent claudication ⟶ Cramping pain.
- Rest pain
- Gangrene

} Progressive pain.



Chronic arterial occlusion : Formation of collaterals

----- Active space -----

Differentials :

Intermittent claudication	Osteoarthritis	Neurogenic claudication
Cramping pain after walking a certain distance.	Maximum pain on first step.	Pain varies with posture • Bending forward : Relieved. • Standing straight : Aggravated.
Pain is one level below site of occlusion.	Pain in affected joint.	
• Due to substance P. • Progresses to rest pain.	-	D/t lumbar canal stenosis.

Boyd's Classification :

Class 1	Class 2	Class 3	Class 4
Pain on walking ↓ Reduces as patient continues to walk	Pain on walking ↓ Able to walk despite pain	Pain forces patient to stop	Pain at rest

Site of Obstruction :

1. Aortoiliac :
   - Buttock claudication (Earliest).
   - Pain in thigh & calves.
   - Bruit over aortoliac region.
   - Impotence in males (Leriche Syndrome).
2. Iliac : Thigh pain.
3. Femoropopliteal : Calf pain.
4. Distal obstruction : Ankle pain.

Investigations :

IOC : Doppler or Duplex (Doppler + B-mode USG) scan.

ABPI : Ankle brachial pressure index = $\frac{\text{Max systolic BP at ankle}}{\text{Max systolic BP at brachial artery}}$

Values	Inference
> 1.4	Calcified vessels (DM/CKD)
0.9 – 1.4	Normal
< 0.9	Intermittent claudication
< 0.4	CLTI
> 20% drop after exercise	Flow limiting arterial disease

Bailey updates :

- Patients with ABPI < 0.5 are twice as likely to deteriorate more than those with > 0.5.
- Gradually decreasing ABPI : Sign of imminent limb loss.

----- Active space -----

- For every 0.1 decrease in ABPI below 0.9 – Risk of cardiac mortality increases by 10%.

Note : CLTI (Chronic limb threatening ischemia)

- Ischemic rest pain ± ulceration/gangrene.
- Require urgent assessment & treatment.

TBI (Toe brachial pressure index) :

- Used in DM patients with ABPI > 1.4.
- More reliable : Digital arteries are rarely affected by sclerosis.
- TBI < 0.6 indicates an arterial lesion.

Digital subtraction angiography (DSA) :

- Only done if intervention is planned.
- Provides dynamic arterial flow + anatomy of vessels.
- Complications :
  - Bleeding.
  - Dissection.
  - Thrombosis.
  - Renal dysfunction.
  - Aneurysm.

Buerger's vs Atherosclerosis

00:13:47

	Buerger's disease (Thromboangitis obliterans)	Atherosclerosis
Gender	M > F	M = F
Age	3rd decade	≥ 5th decade
Risk factors	Smoking	Smoking, alcohol, type A personality, hyperlipidemia
Limbs affected	Lower limbs > Upper limbs	Lower limbs > Upper limbs
Affected structures	Artery, vein, nerve	Arteries
Progression	Distal → Proximal	Proximal → Distal
Vessels affected	Small to medium	Large to medium
Other features	Confirmatory test : Muscle biopsy	-
Management	1. Stop smoking. 2. Pentoxyphylline. 3. Conservative amputation 4. Lumbar sympathectomy : – Only if rest pain ⊕, C/I : Claudication – If B/L, conserve L1 ganglion on one side (To prevent impotence)	1. Angioplasty (First line) 2. Bypass (Best) : Using grafts

Buerger's disease :

1. Gangrene of toes

2. CT angiography

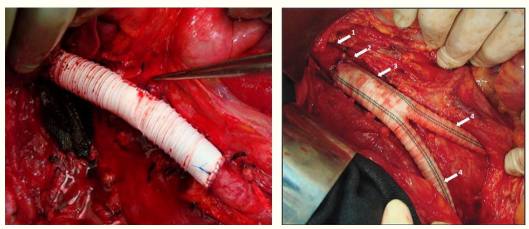
----- Active space -----

Management of Atherosclerosis :

1. Angioplasty & stenting :
   - 1st line Rx.
   - Successful for iliac & femoropopliteal (Less successful below knee).
   - Complications :
     - Failure
     - Hematoma
     - Bleeding
     - Thrombosis

Endovascular stenting

2. Grafting : Best method.
   - Suprainguinal :
     - Aorto-bifemoral.
     - Dacron graft (Best).
   - Best infra-inguinal graft : Reversed saphenous vein (GSV).
     - S/E during harvesting : Saphenous nerve injury.
   - Best synthetic graft : PTFE.



Synthetic graft

Gangrene

00:20:02

Dry gangrene	Wet gangrene
• Dessicated tissue : D/t gradual slowing of blood. • Good line of demarcation. • If bone involved : Conical stump.	• D/t venous blockade or superadded infection. • Poor line of demarcation → Can be proximal d/t extension of infection

Dry gangrene

Wet gangrene

----- Active space -----

Amputation :

Indications : Cancer, gas gangrene, contractures.

Types :

- Local amputation of digits : DM.
- Ray excision : Metatarsophalangeal joint.
- Transmetatarsal : Several toes affected.

Below Knee amputation	Above Knee amputation
• Preserves knee. • Best chance of walking. • Amputation stump : ≥ 8cm below knee (10-12cm). • Flaps : Long posterior, skew flap.	• Heals well. • Amputation stump : ≥ 20cm.

Long posterior flap marking

Complications :

- Early :
  a. Hemorrhage.
  b. Infection.
  c. Flap necrosis.
  d. DVT.
- Late :
  a. Pain.
  b. Phantom limb syndrome.

Aortic Aneurysm 00:22:27

Aneurysm vessels :

- m/c vessel involved : Circle of Willis.
- m/c extracranial vessel : Infrarenal abdominal aorta.
- m/c peripheral vessel : Popliteal artery.
- m/c visceral vessel : Splenic artery
- m/c vessel in mycotic aneurysm : Abdominal aorta (D/t S. aureus).

----- Active space -----

ABDOMINAL AORTIC ANEURYSM (AAA) :

M/c site : Infrarenal abdominal aorta.

Most important risk factor : Atherosclerosis.

Screening : USG (From 65 yrs).

Critical Diameter :

- Abdominal aortic aneurysm : 5.5cm.
- Ascending thoracic aortic aneurysm : 5.5cm.
- Descending thoracic aortic aneurysm : 6cm.
- Marfan's + thoracic aortic aneurysm : 4.5 – 5cm.

} ↑ Risk of rupture beyond this size.

Clinical Features :

- Asymptomatic.
- Blue toe syndrome (D/t emboli from aneurysm).
- Rupture into left retroperitoneum (High mortality > 50%).
- Abdominal pain.
- Pulsatile mass.

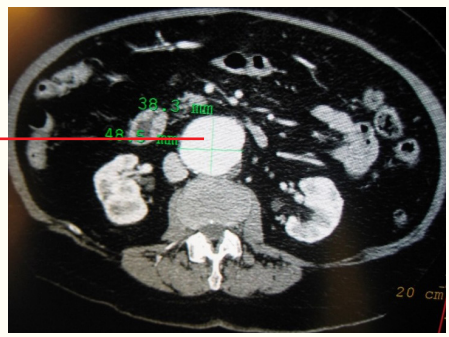
Management :

IOC : CT Angiography.

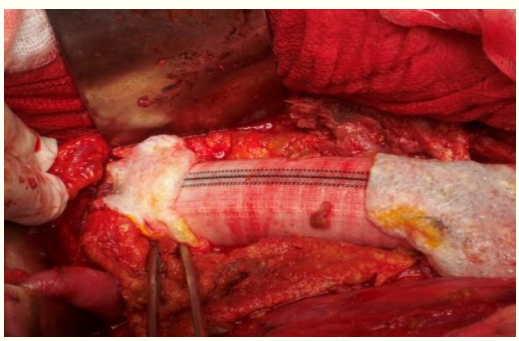
Treatment :

1. Open repair :
   - Indication
   - Advantage

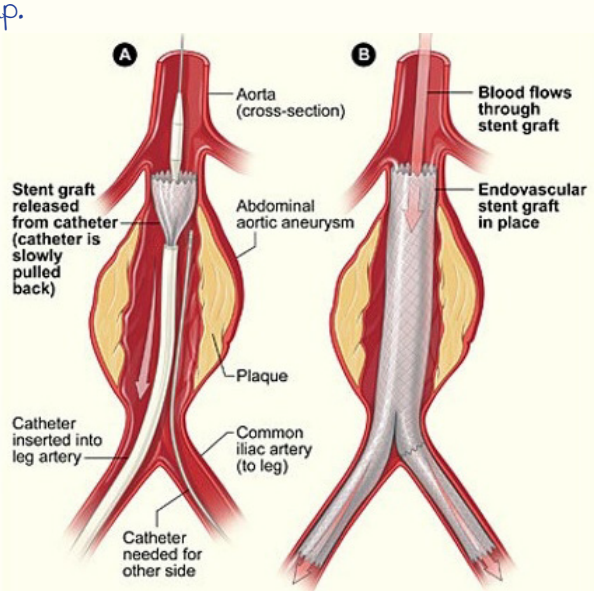
   } Longer life expectancy
2. EVAR (Endovascular aneurysm repair) :
   - Indications : High risk patients, hostile abdomen.
   - Disadvantage : Life long follow-up.
   - Complications : Endoleaks.



CT Angiogram



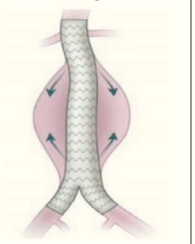
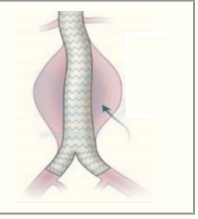
Open repair



EVAR

----- Active space -----

Types of endoleaks :

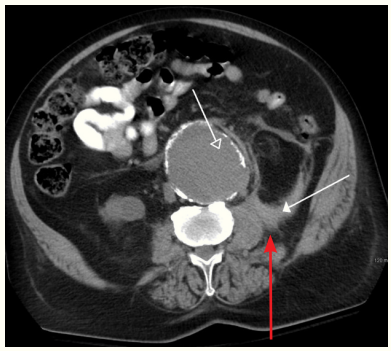
Type	Cause	m/c procedure	Image
Type 1	Improper seal	Thoracic aortic aneurysm repair	
Type 2	Retrograde leak from lumbar vessels	Abdominal aortic aneurysm repair	

Note : Exposure of great vessels.

Mattox manoeuvre	Cattle-Brasch manoeuvre
• Left medial visceral rotation of descending colon. • Exposes abdominal aorta. (Aneurysm repair)	• Right visceral medial rotation of ascending colon. • Exposes IVC.

Complications of EVAR :

1. Cardiovascular causes : m/c cause of mortality.
2. Renal failure.
3. Aortoduodenal fistula (Haematemesis).
4. Left sided colonic ischemia :
   - D/t splenic flexure / Griffith point (Watershed area).
   - C/f : Bloody diarrhea.
5. Paraparesis : D/t artery of Adamkiewicz.
6. Mortality : 2-3%. (> 50% if rupture ⊕).



Ruptured aneurysm

Aortic Dissection

00:29:41

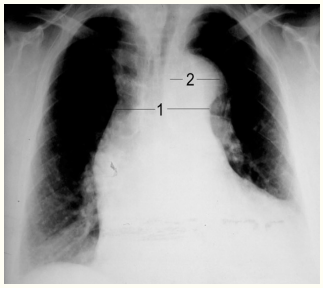
False lumen is formed ⟶ Blood flows b/w intima & media.

Features :

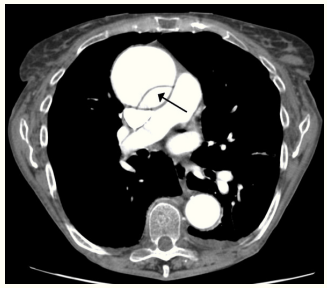
- m/c site : Lateral wall of ascending thoracic aorta.
- Most important risk factor : HTN.
- m/c symptom : Chest pain radiating to the back.
- m > F.
- Seen in 5th decade.
- Causes coronary insufficiency.
- B/L upper limbs : Different BP readings.

Investigations :

1. Chest X-ray :
   - Widening of mediastinum.
   - Depression of the left main bronchus.
2. CT angiography :
   IOC in stable patients.
3. Transesophageal echocardiography : IOC in unstable patients.



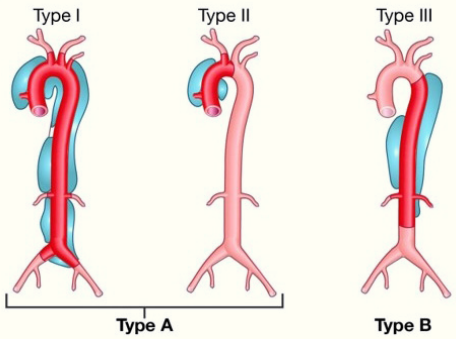
Chest X-Ray


CT angiogram

----- Active space -----

Classification :

DeBakey	Extent	Stanford
I (m/c)	Ascending + descending	A
II	Only ascending	
III	Only descending	B



Stanford Classification

Management :

(1st Step) IV Esmolol for permissive hypotension

DeBakey type

- I & 2 → Graft repair (Open/EVAR).
- 3 → Monitor → Deterioration → Surgery.

Popliteal Aneurysm

00:34:10

m/c peripheral vessel involved.

Features :

- Loss of contour of popliteal fossa.
- Pulsatile swelling behind Knee.

Management :

Indications :

1. All symptomatic patients.
2. Asymptomatic + >2cm size.

Treatment : Graft repair.

----- Active space -----

Raynaud's Phenomenon

00:34:35

Causes :

1. Cold weather
2. H/o use of drilling equipment

} Vasospasm.

Features :

Colour change : White → Blue → Red
(Pain ⊕)

Primary vs Secondary :

	Primary	Secondary
Prevelance	Common	Rare
Association with collagen vascular diseases	No	Yes
Complications	Rare	Yes
Pharmacological Rx	No (Occasional)	DOC : CCB

Subclavian Steal Syndrome

00:36:01

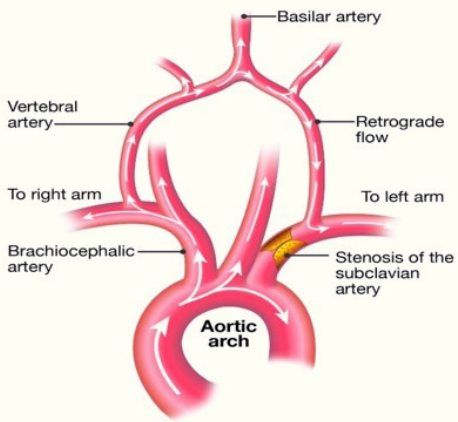
Pathophysiology :

Subclavian artery (1st part) stenosis
↓ upper limb exercise
Retrograde blood flow vertebral/basilar artery
↓

Clinical feature : Syncopal attack after exercise.

IOC : CT angiography.

Rx : Angioplasty.



Thoracic Outlet Syndrome

00:36:53

Etology :

- Poor muscle tone.
- Cervical rib.

Clinical Features :

- Arterial occlusion → Gangrene/claudication.
- Venous occlusion → Subclavian vein thrombosis.
- Compression of brachial plexus → Pain along ulnar border.

----- Active space -----

Tests :

Test	Positive sign
Adson's test	↓ / Absence of ipsilateral pulse.
Roos/Elevated arm stress test	Continuous pain, paresthesia, heaviness/ weakness.

Management :

1. Cut cervical rib.
2. Physiotherapy.
3. Angioplasty / grafting for thrombosis.

AV Malformations

00:38:59

Causes :

1. Traumatic.
2. Iatrogenic (m/c) :
   - Cimmino/Radiocephalic fistula : For dialysis.
   - Test for radioulnar patency : Allen's test.
3. Congenital

Note :

Crisoid Aneurysm :

- AV malformation of superficial temporal vessels.
- Pulsatile swelling on the head.

Crisoid aneurysm

Clinical Features :

- Pulsatile swelling
- Hypertrophy of limb
- High output cardiac failure

} Congenital fistula.

- Nicoladoni/Branham sign : Pressing feeding vessel → Size ↓, Pulse ↓, Systolic BP ↑

Management :

IOC : CT/MR Angiography.

Rx : Embolisation.

Deep Vein Thrombosis (DVT)

00:41:21

Risk Factors : Virchow's triad

Stasis :
Obesity.

Endothelial injury :
- Trauma.
- Surgery.

Hypercoagulable state :
- Immobility.
- Puerperium.
- High dose estrogen.
- Pregnancy.
- Malignancy.

----- Active space -----

Clinical Features :

1. Pain & swelling.
2. Limb edema (Constant sign) : Mostly U/L lower limb.
3. Homan's sign : Dorsiflexion of foot → Resistance in calf.
4. Moses sign : Squeeze calf → Pain.

Phlegmasia alba dolens :
- Painful white/milk limb.
- Thrombosis of : major axial veins.

Phlegmasia cerulea dolens :
- Painful blue limb.
- Thrombosis of : major axial veins + collaterals.

Investigations :

1. Doppler/Duplex Scan : IOC.
2. CT Angiography : If suspecting pulmonary embolism.

Treatment :

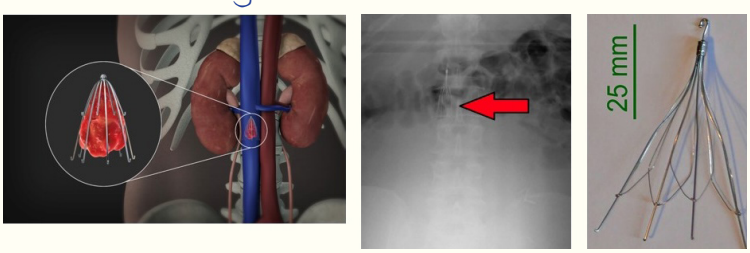
1. Patient presents within 6-8 hours :
   - Yes → Direct thrombolysis
   - No → Anticoagulants :
     - First 5 days : LMWH + warfarin.
     - After 5 days : Only warfarin.
     - Target INR : 2-3.

Well's criteria	
Score	Probability
-2 to 0	Low
1 to 2	moderate
> 2	High

2. Pregnancy : LMWH.
3. Heparin Sensitive :
   - Fondaparinux
   - Bivalirudin
   - NOAC (DOC) : Rivaroxaban, Apixaban

INR (International Normalised Ratio) $= \frac{PT_{Patient}}{PT_{Control}}$

4. Greenfield filter :
   - Recurent thromboembolism despite auticoagulation.
   - C/I to anticoagulation (Eg : Brain hemorrhage).
   - Complications of recurrent PE → Pulmonary hypertension.
   - Complications of anticoagulation.



IVC filter

Complications :


Post thrombotic leg

----- Active space -----

Post thrombotic leg :

- In 2/3rd patients : 2° varicose veins following DVT.
- Maximum blood flow shifts from deep to superficial system.
- C/f : Varicose veins, pigmentation, lipodermatosclerosis.
- Varicose vein surgery is contraindicated.

DVT Prophylaxis :

High risk patients :

1. Major orthopedic surgery/fracture of hip, pelvis, lower limb.
2. Major abdominal/pelvic surgery.
3. Major surgery in patient with h/o DVT/pulmonary embolism.
4. Lower limb paralysis.
5. Lower limb amputation.

Prophylaxis in high risk patients : Dual prophylaxis.

Pharmacological : + LMWH

Mechanical :

- Early ambulation.
- Pneumatic compression stockings.


Pneumatic compression stockings

Varicose Veins

00:50:17

Anatomy :

	Site of origin	Drains into
GSV	Medial & anterior part of foot	Saphenofemoral junction (Constant : 4 cm below & lateral to pubic tubercle)
SSV	Posterior part of foot	Saphenopopliteal junction (Variable location)

Note : Vein of Giacomini (Connects SSV to GSV) ⟶ ↑ Recurrence rate.

Vein	Associated neve	Surgical implication
GSV	Saphenous nerve (Below Knee)	No stripping below knee
SSV	Sural nerve	No stripping

----- Active space -----

Perforators : Superficial → Deep.

- Hunterian : Thigh.
- Dodd : Above Knee.
- Boyd : Below Knee.
- Cockett : 5, 10, 15 cm above medial malleolus.
- May Kuster : Heel.

Varicose veins

Clinical Features :

1. Dilated veins (m/c) :
   - >3mm : Varicose veins.
   - 1-3mm : Reticular veins.
   - <1mm : Thread veins /Dermal flares/Telengiectatic veins.
2. Corona phlebectasiae/malleolar flare :
   - Fan shaped arrangement of thread veins around ankle.
   - Early sign of advanced disease.
3. Atrophie blanchie : Areas of depigmentation surrounded by dilated veins.
4. Pigmentation : D/t hemosiderin deposition.
5. Lipodermatosclerosis : D/t obliteration of fat.
   - Shiny skin.
   - Tendoachilles contracture.
   - Inverted champagne bottle appearance.
6. Dull aching pain.
7. Venous ulcers.

Thread veins

Atrophie blanchie

Lipodermatosclerosis

----- Active space -----

CEAP Classification :

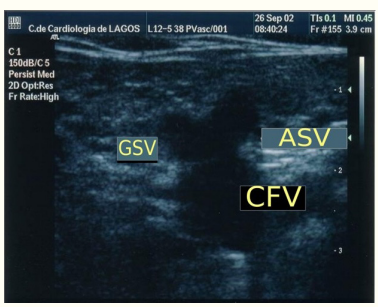
Grade	Clinical features
C0	No visible or palpable signs of venous disease
C1	Telangiectasias or reticular veins
C2	Varicose veins (> 3 mm)
C2r	Recurrent varicose veins
C3	Edema
C4	Changes in skin and subcutaneous tissue secondary to chronic venous disease
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or atrophie blanche
C4c	Corona phlebectatica
C5	Healed ulcer
C6	Active venous ulcer
C6r	Recurrent active venous ulcer

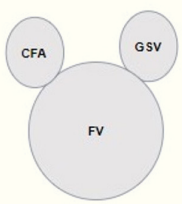
Investigations :

IOC : Doppler.

Mickey mouse sign :

CFA (Common femoral artery)
+
GSV (Great saphenous vein)
+
FV (Femoral vein)





Mickey mouse sign

Note : Profunda femoris is not a part of mickey mouse sign.

Clinical Tests :

For SFJ incompetence	For perforator incompetence	For DVT
• Trendelenburg test. • Morrisey cough impulse. • Schwartz test.	• Trendelenburg test. • Multiple tourniquet test. • Fegan's method.	Modified Perthe's test.

Management :

1. Adjuncts to surgery : Compression garments class III (25–35mmHg).
2. Surgery :
   a. EVLT (Endovenous laser therapy)
   b. RFA (Radiofrequency ablation)
   } TOC.
   c. Trendelenberg procedure (Flush ligation of SFJ) ± stripping of veins.
   Prevention of recurrence : Ligation of tributaries.

----- Active space -----

3. Foam sclerotherapy : Tessari technique.
   - Sclerosant : Sodium tetradecyl sulphate.
   - Air : Sclerosant = 3 : 1 or 4 : 1.
   - Rx for thread veins/dermal flares.

Foam sclerotherapy

Complications :

Complications of varicose vein surgery	Complications of varicose veins
• Injury to nerves (m/c) : Saphenous nerve, sural nerve. • Wound infection. • Bruising. • Recurrence (SSV > GSV). • Bleeding. • Injury to vessels.	• Bleeding. • Calcification. • Superficial thrombophlebitis. • Pigmentation. • Lipodermatosclerosis. • Ulceration.

Ulcers

01:02:00

Venous Ulcer :

m/c site : Medial malleolus/Gaiter's. area.

Cause : Ambulatory venous hypertension theory.


Venous ulcer

Clinical Features :

1. Shallow ulcer.
2. Sloping edges.
3. Pale graulation tissue.
4. Pigmented margins.

Management :

1. Bisgaard's regime :
   - Education.
   - Elevation of limb.
   - Elastic compression stockings.
   - Dressings.
2. Surgery.
3. Pentoxyphylline : Increases microvascular perfusion.

Complication :

Marjolin's ulcer :

- SCC developing from longstanding venous ulcers/burn scars.
- Mx : Wide local excision.


Marjolin's ulcer

----- Active space -----

Note :

Types of ulcer edges.

Edge	Condition
Sloping	venous ulcer, healing ulcer
Punched out	Arterial ulcer, neuropathic ulcer, bed sores, syphilis
Undermined	TB
Rolled out	BCC(Rodent), marjolin's ulcer
Cauliflower	Squamous cell carcinoma

D/D of Leg Ulcers :

	Venous ulcer	Arterial ulcer	Trophic ulcer	Diabetic ulcer
Site	Medial malleolus/ Gaiter area	Dorsum/ lateral side	Sole/base of the great toe	Sole/base of the great toe
Arterial pulsations	Normal	Absent pulsations	Normal pulsations	may be absent
Dilated veins	Present	N/A	N/A	N/A
Sensation	Normal	Painful	Reduced sensations	Reduced sensations
Margins	Sloping	Punched out	Punched out	Punched out
Mx	1. Debridement. 2. VAC Dressing (-125 mmHg) : C/I in osteomyelitis with DM.			

Arterial ulcers :

- H/o claudication.
- Loss of muscle mass/hair.

Diabetic ulcers :

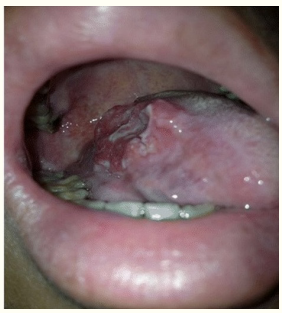
- Microangiopathy.
- Increased glucose.


Arterial ulcer


Diabetic ulcer

----- Active space -----

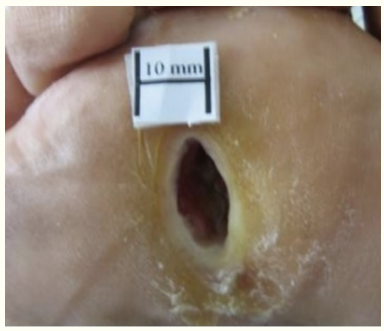

Basal cell carcinoma (BCC)



Squamous cell carcinoma (SCC)

Tubercular ulcer

VAC dressing

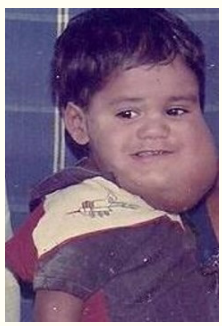


Trophic ulcer

Cystic Hygroma

01:09:07

- Sequestered lymphatic tissue.
- m/c site : Posterior triangle of neck.
- Clinical features : Fluctuant swelling, brilliantly transilluminant, partly compressible.
- mx : Aspiration f/b surgery.
- Nerve at risk during Sx : Spinal accessory nerve.



Lymphedema

01:09:54

Excessive interstitial fluid.

Classification :

Primary :

Congenita	Praecox	Tarda
0 – 2 yrs	2 – 35yrs	> 35 yrs
M > F	F > M	
• Multiple limbs • Face • Genitalia	U/L till knee	-
Noone Milroy syndrome : • Familial • FLT-4 gene	Meig's disease : • Familial • GJC gene	

----- Active space -----

Secondary (m/c) :

- Upper limb m/c cause : Post mastectomy/Post lymph node clearance.
- Lower limb m/c cause : Filariasis/Elephantiasis.

Post mastectomy

Filariasis

Brunners Classification :

Subclinical (Latent)	Excess interstitial fluid with no clinical signs
Stage I	Pitting edema
Stage II	Non pitting edema
Stage III	Edema + irreversible skin changes : • Stemmer's sign : Inability to pinch the skin. • Buffalo hump : Loss of ankle contour.

Skin changes in lymphedema

Stewart-Treves Syndrome :

- Developement of angiosarcoma in long standing lymphedema (8-10 yrs).
- Bluish / Reddish nodules.

Investigations :

Gold standard : Water plethysmography
- Mild : < 20%.
- Moderate : 20-40%.
- Severe : > 40%.

Management :

1. Skin care :
   - Protect skin while chopping vegetables/gardening.
   - Never walk barefoot.
   - Use electric razors to depilate.
   - Never let the skin become macerated.
   - Treat cuts with antibiotics.
   - No blood sampling from affected limb.
   - Use sunscreen.

----- Active space -----

2. Decongestive lymphedema therapy :

1st Intensive phase	2nd Maintenance phase
Supervised	Self care
• Manual lymphatic drainage • Multilayer lymphedema bandaging	

3. Exercises :
   - Slow rhythmic isotonic (Eg : Swimming).
   - Vigourous, anaerobic, isometric exercise worsens lymphedema.

4. Surgery :
   - Lymphovenous anastamosis : TOC.
   - Reduction procedures : Not done.