



EDITION



SURGERY

ED.08

PATIENT SAFETY, OT ZONES AND SURGERY POSITIONS

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

Consents, IV lines & surgical safety checklist

00:01:58

CONSENTS

Components :

- Identification.
- Diagnosis.
- Procedure planned.
- Surgeon.
- Description.
- Patient specific complications.
- Procedure specific complications : Any complication > 1% incidence.
- Benefits.
- Alternate procedure.
- Sign of patient, surgeon, witness.

IV LINES

Color-coding of IV cannulas



Narrow ← Wide

Color	Gauge	Maximal Flow Rate(ml/min)
Yellow	24G	13 (10)
Blue	22G	31 (30)
Pink	20G	67 (60)
Green	18G	96 ml/min
Gray	16G	236 (240ml/min)
Orange (used in shock)	14G	270

} Paediatric Patients

Complications :

Superficial thrombophlebitis : m/c

- Features : Tender, Cord-like swelling.
- management : Topical heparinoid.



Superficial thrombophlebitis

Feedback



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SURGICAL SAFETY CHECKLIST

Before induction of Anaesthesia (Ward to OT complex)	→ Before skin incision →	Before Patient leaves operating room
Sign in	Time out	Sign out
1. Patient has confirmed : <ul style="list-style-type: none"> • Identity • Site (marked) • Procedure • Written consent 	1. Confirm : <ul style="list-style-type: none"> • Patient site • Procedure name • Time 	1. Instruments, sponge & needle count 648c85cfee3b03a74e182fab
2. Known allergies	2. Antibiotic prophylaxis : Given within last 30 min	2. Specimen labelling (Including patient name)
3. Risk of >500 ml blood loss	3. Anticipate blood loss (By surgeon)	3. Actual blood loss (By anaesthetist)

Note :

There is **no time in phase.**

Estimating amount of blood loss :

- Actual amount = Blood in suction - Irrigation fluid

or

Wet mop weight - Dry mop weight.

- Soaked mop : 100 cc.
- Fist full of clots : 500 cc.

Radio opaque line
(Picked up on xray)



Soaked mop

OT zones & Positions, Air embolism and Patient safety

00:24:49

OT ZONING

1. Protective Zone :

- Change rooms.
- Transfer bay.
- Pre & post op rooms.
- ICU/PACU.

2. Clean Zone (Connects protective zone to aseptic zone) :

- Equipment store room.
- Maintenance workshop.

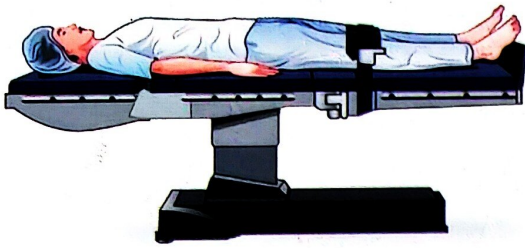
3. Aseptic zone : OT

4. Disposal zone.

Feedback



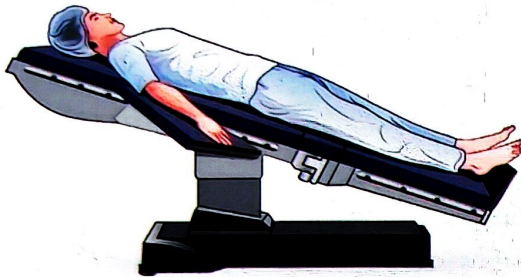
OT POSITIONS



1. Supine position / neutral position :
m/c position used for abdominal and breast surgeries.



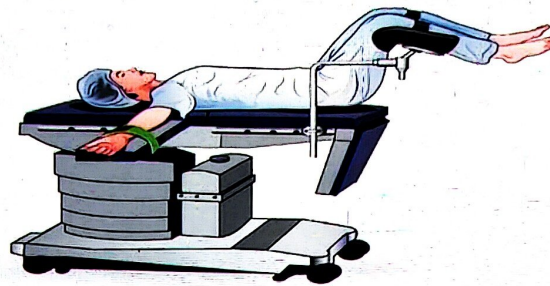
2. Trendelenberg position :
Used in Pelvic surgeries



3. Reverse Trendelenberg position :
• Used in upper abdominal surgeries.
• Used in laparoscopic cholecystectomy with right side up.

CO₂ collects below right dome of diaphragm

Right shoulder tip pain : m/c complication.



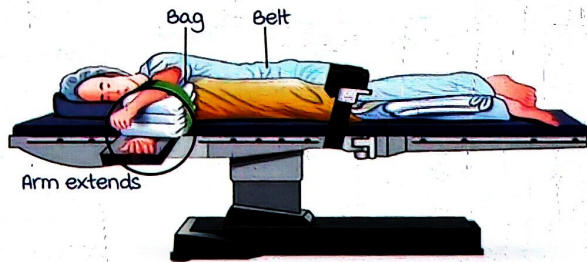
4. Lithotomy
• Uses :
- Obstetric procedures.
- Gynecologic procedures.
- Urologic procedures (TURP).
- Hemorrhoid Surgeries.
• Nerve injured if legs are not supported properly : Common peroneal nerve.

5. Lateral or Kidney position :

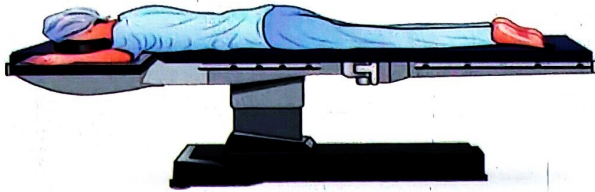
Uses :

- Thoracotomy.
- Pyelolithotomy.
- Nephrolithotomy.
- Nephrectomy.
- Breast reconstruction : Latissimus Dorsi Flap

Increased risk for brachial plexus injury (D/t hyperextended arm).



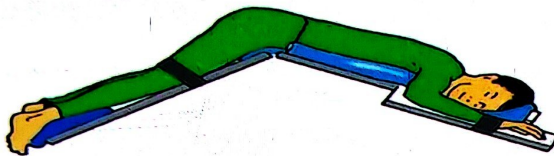
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6. Prone position :

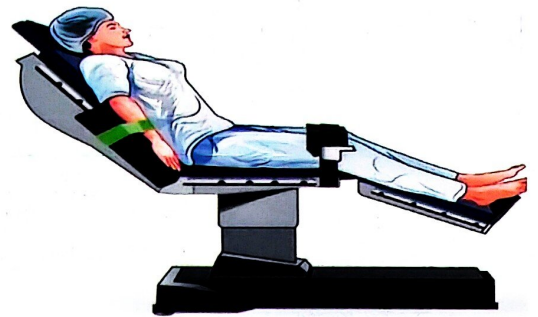
Uses :

- Spinal surgery
- Pilonidal sinus surgery.



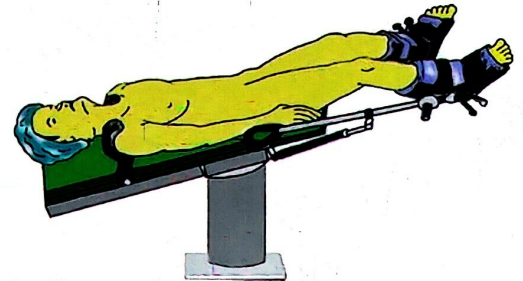
8. Jackknife position :

- Obsolete position.
- Previously used for hemorrhoid fissure surgeries.
- Complication : Positional asphyxia.



7. Sitting / Fowler's position :

- Used for posterior cranial fossa surgery.
- Advantages :
 - ↓ Blood loss (Blood less field).
 - ↑ Exposure.
- Disadvantages : ↑ Risk of air embolism.



9. Lloyd Davies position :

- Trendelenberg + Lithotomy position.
- Used in rectal cancer surgery.

AIR EMBOLISM

Air (50-100cc) sucked into vein → Enter circulation → Dysregulates cardiac functioning.

Risk factors :

- Thyroid/Head & neck surgeries.
- Sitting/Fowler's position.

Clinical Features :

- Sudden desaturation.
- Dyspnea
- Hypotension.

Prevention of air embolism in Fowler's position :

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1. Ligate vein before cutting.
2. Irrigate Field.

management :

Durant position → Followed by → Aspirate air using direct puncture/central line.

- Right side up (Left lateral) + Legs up.
- used if suspicion of air embolism (+).

EVENTS IN PATIENT SAFETY

An adverse event	An incident that results in harm to the patient
A near miss	An incident that could have resulted in unwanted consequences but did not, either by chance or through a timely intervention preventing the event from reaching the patient
A no-harm event	<ul style="list-style-type: none"> • An incident that occurs and reaches the patient but results in no injury to the patient. • Harm is avoided by chance or due to mitigating circumstances.

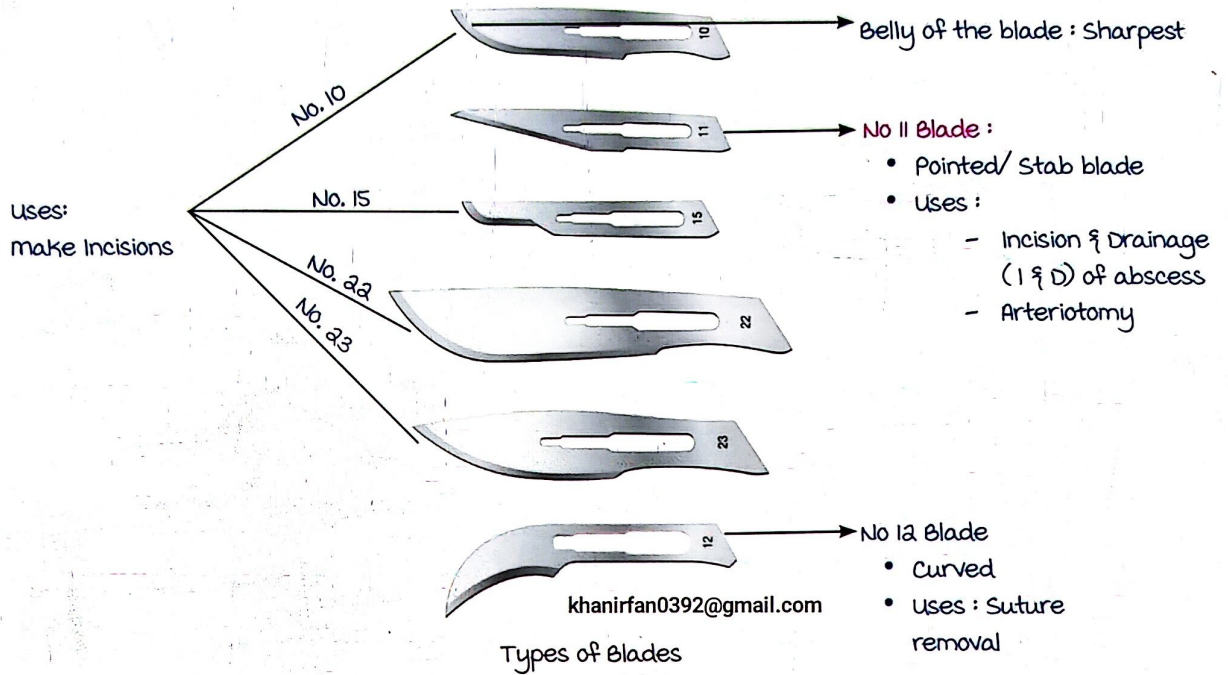
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SURGICAL BLADES AND ENERGY SOURCES

Types of Blades & Incisions

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BLADES



- Passed in kidney tray / pointed end facing towards self.
- mounted on BP (Bard Parker) handle.



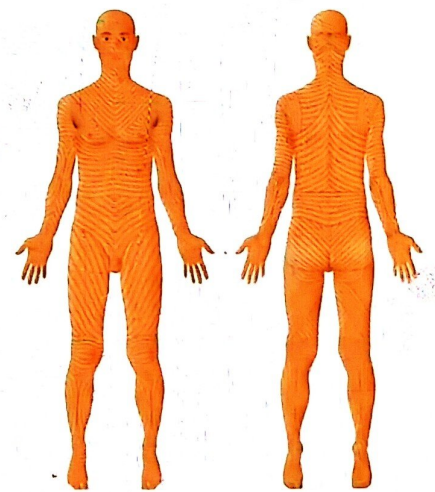
BP Handle

INCISIONS

- Perpendicular to skin.
- Go far $\xrightarrow{\text{to}}$ Near.

Factors while planning an Incision :

- **Langer's lines** (Relaxed tension lines) : orientation of dermal collagen fibers.
 - Incision placed parallel : Good scar.
 - muscle fibre action is perpendicular.
- Avoid injury to anatomical structures.
- Cosmetic factor : Parallel to Langer's lines / hidden in skin creases.
- Adequate access.



Langer's lines

Bleeding Control

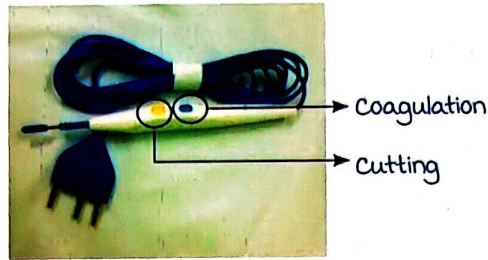
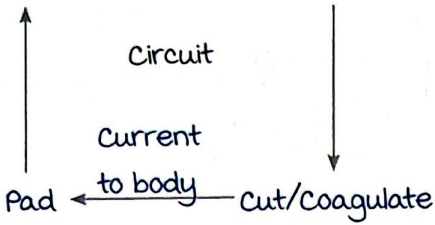
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ENERGY SOURCES

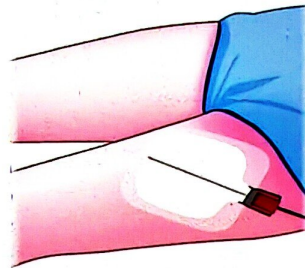
1. monopolar Cautery :

- machine $\xrightarrow{\text{Current}}$ Tip (Bovie tip)



Cautery pad :

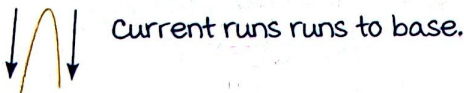
- Placed over well-vascularized area.
- Have wide area of contact.
- Small cautery pad : Burns at site.
- No cautery pad : Circuit incomplete.



monopolar will not work

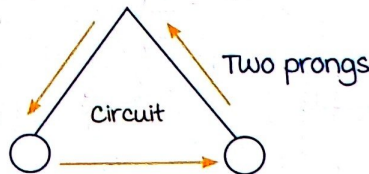
khanirfan0392@gmail.com
Disadvantages :

- Lateral spread of current.
- Thermal damage to nearby structures.
- Current interferes with cardiac conduction.
- Avoid in patients with cardiac pacemakers.
- Pedicle \rightarrow Channelisation of current.



Avoid close to end arteries.

2. Bipolar cautery :



- Circuit completed locally.

Feedback

8

General Surgery

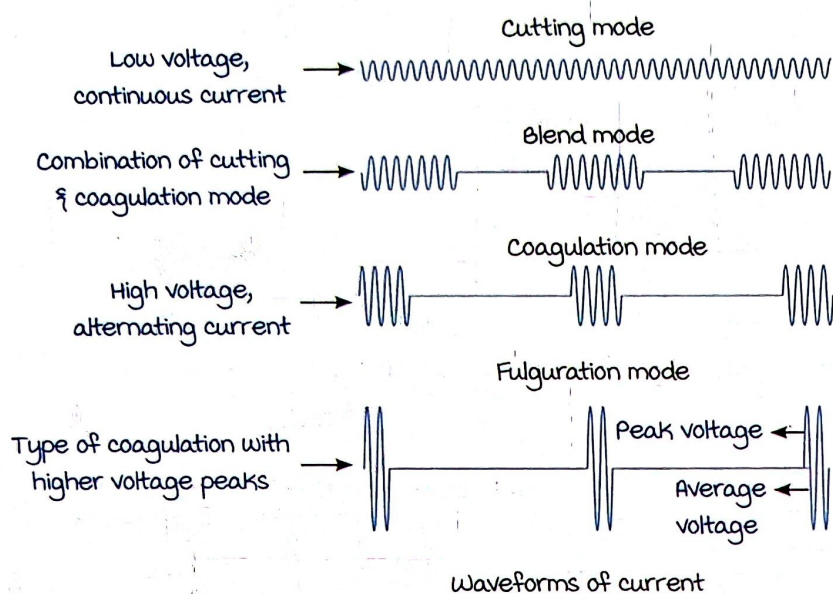
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Advantages :

- No cautery pad required
- Safe close to vital structure and end arteries.

Uses :

- Coagulation only



Currents :

1. Cutting current :

Heat → Cell water explosion

2. Coagulation current :

Dehydration + Protein Denaturation

↓
Cell death.

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3. Ligasure :

- Heat + pressure.
- Uses body collagen & elastin to seal & divide.
- **Feedback mechanism** : Regulate energy delivery.
- Automatic discontinuation on seal closure.
- Used till 7mm diameter.
- Disadvantage : cannot be used close to vital structures.

4. Harmonic Scalpel :

- Works on ultrasonic principle.
- Oscillatory blade : Oscillates between 2000-50000 Hz.

↓
Protein denaturation + coagulation without heat production.

Harmonic Scalpel

Advantages :

- Can be used close to vital structures.
- Precise cuts.
- Cut through scar tissue.

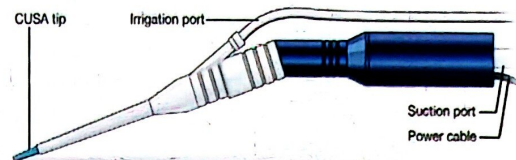
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Disadvantages :

- Time consuming

CUSA :

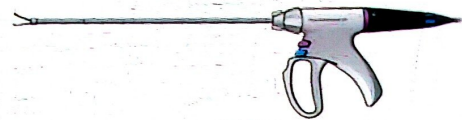
- Type of harmonic scalpel
- Used for **liver resection** :
Hepatocytes susceptible to oscillatory fragmentation d/t high water content and collagen.
- Better in non-cirrhotic liver.
- Can aspirate gases as well.



Cavitron Ultrasonic Surgical Aspirator (CUSA)

5. Thunderbeat S:Features of both **Ligasure** + **Harmonic Scalpel**.**6. RFA (Radio Frequency Ablation) :**

- High frequency, alternating current.
- Similar to electrocautery : Grounding pad needed.
- Use : Liver tumor resection upto 3 cm.



Thunderbeat S

7. Microwave :

- Between infra-red & radiowaves.
- Oscillation & frictional heat.
- Advantages :
 - No grounding pad required.
 - Less time than RFA.
 - Homogenous zone of ablation.

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SURGICAL DRAINS, KNOTS AND SUTURES

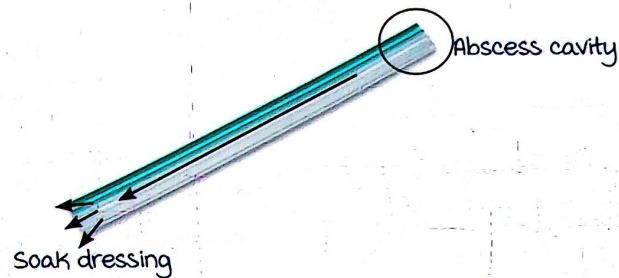
Drains & Knots

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DRAIN TYPES

Open :

Obsolete.

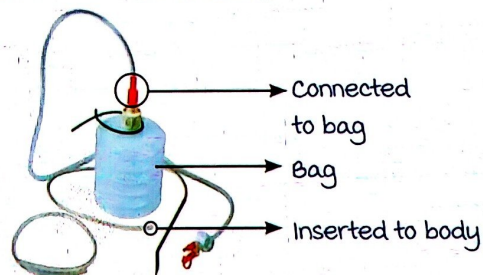


Closed :

Empty into a container/bag.

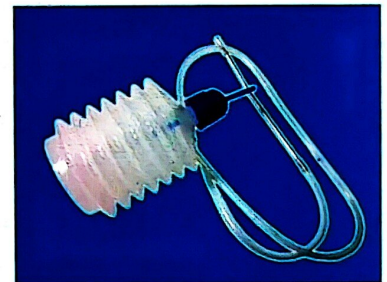
1. Romovac suction drain :

- Closed drain with **-ve pressure**.
- used after mastectomy, thyroidectomy, neck dissection.
- Avoided in abdomen d/t rounded drain **risk of** Perforation.



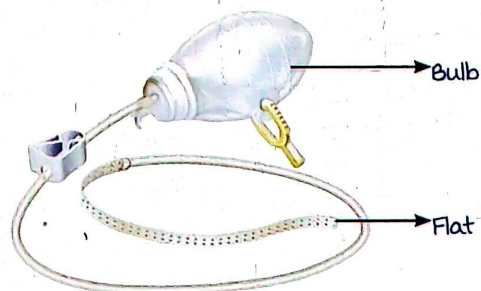
2. minivac drain :

used after sentinel LN biopsy.



3. Jackson Pratt drain :

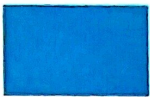
- -ve pressure drain.
- Flat tubes → Can be used in **abdomen**.



4. Abdominal drain :

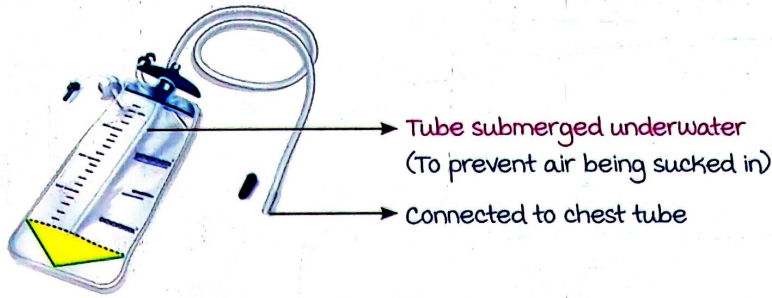
Closed drain, no -ve pressure.





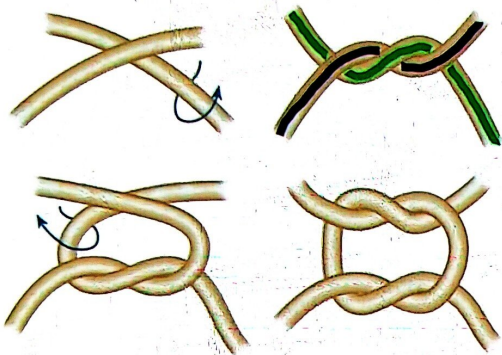
5. underwater seal bag :

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KNOT TYPES

Square/Reef knot : most basic knot.



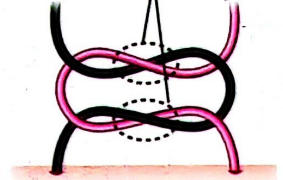
One square throw
 ↓
 Followed by
 Another square throw.

Crossings are same (Black over pink)



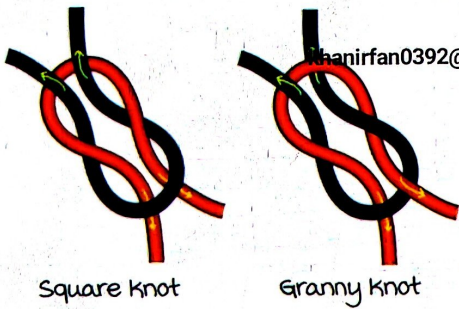
Reef or square knot

Crossings are opposite (Black/Pink)



Granny/slip knot
↓
Don't cross
Open up

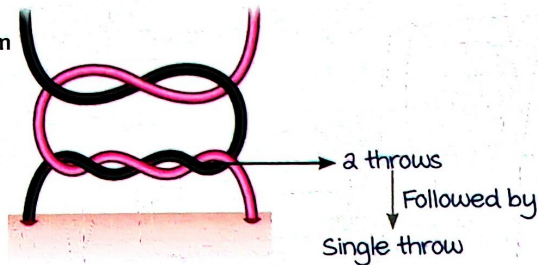
Granny's v/s Reef knot :



Square knot

Granny knot

Surgeon's knot :



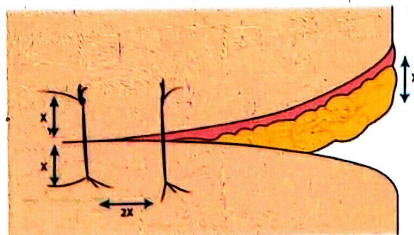
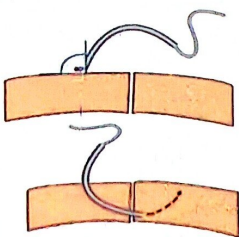
Sutures

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SKIN SUTURING

- Everted edges.
- Enter skin at 90°.

Principles of suturing :



- Bite on each side : x .
- Distance b/w 2 sutures : $2x$.

Feedback



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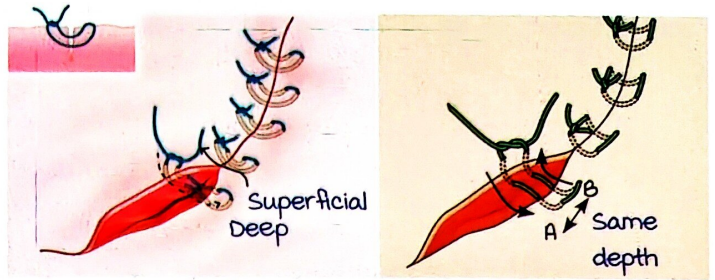
Types :

1. Simple suture :

Fail to cause eversion

2. Mattress suture :

- Cause eversion.
- Hemostasis.

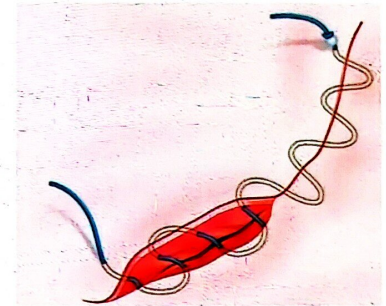


Vertical mattress

Horizontal mattress :
Least cut through rate

3. Subcuticular sutures :

- Cosmetically better (No marks).
- Suture material : 3-0 monocryl on a cutting needle.

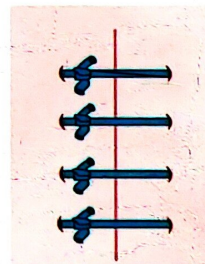


4. Other sutures :

Aberdeen's/Cobbler's knot for closure



Continuous suture

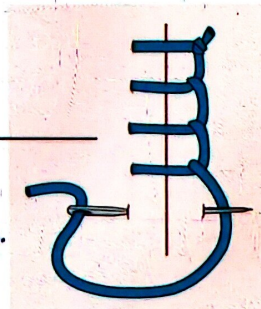


Interrupted suture

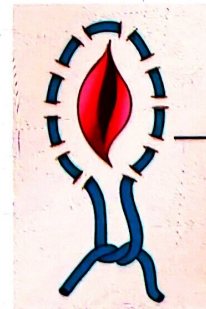


Buried mattress suture

- Continuous suture with locking.
- Distribution of tension.



Lock suture



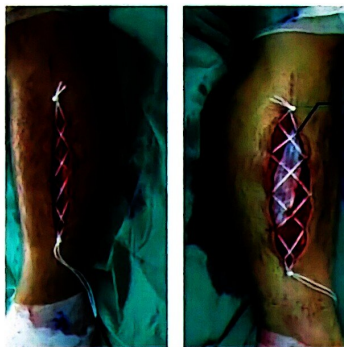
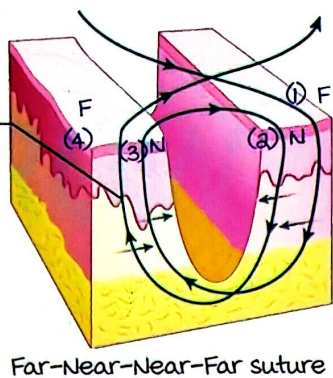
Purse string Suture

Uses :

- Bury appendicular stump.
- Cervical encircage.

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Uses :
Obliteration of a large cavity

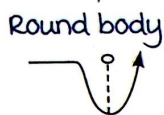


Uses :

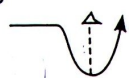
- Fasciotomy wound closure.
- Gradual tightening of suture.
- Healing by 3° intention/ delayed 1° closure.

Needles :

Types :



Cutting/reverse cutting



• Features :

- Splits tissue.
- Relatively atraumatic.
- Delicate structures (B's).

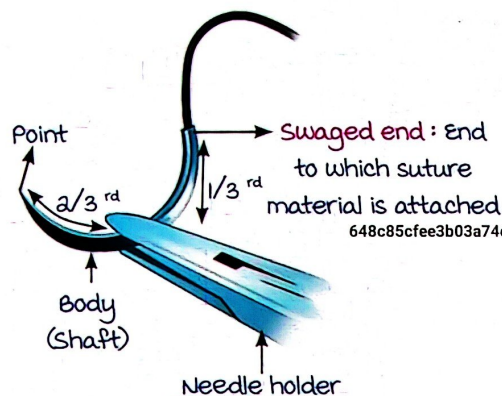
- a. Bowel.
- b. Bladder.
- c. Blood vessels.
- d. CBD

• Features :

- Cuts tissue.
- more traumatic.
- Tough structures (S's).

- a. Sheath.
- b. Skin.
- c. Fascia.

Parts :



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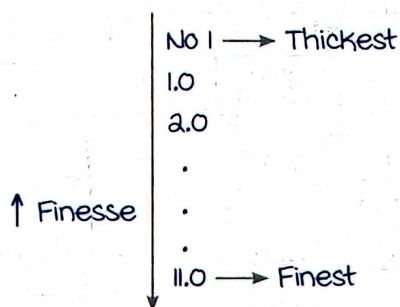
SUTURES

Suture color coding :

Color	Suture type
Brown	Catgut
Violet	Vicryl
Blue	Prolene
Black	Silk

Suture numbering :

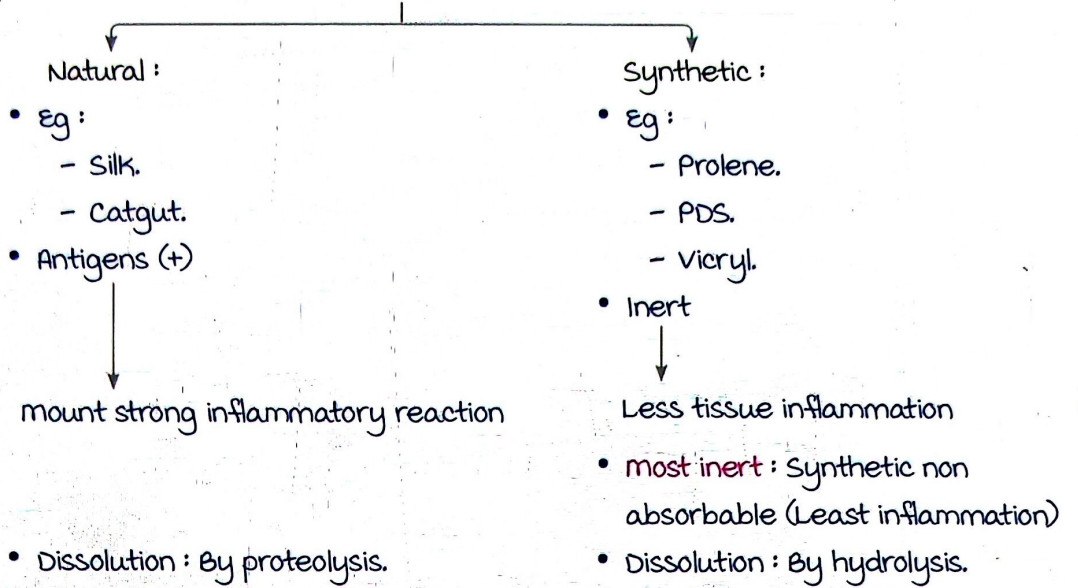
- Suture diameter = 1/10th of a mm.



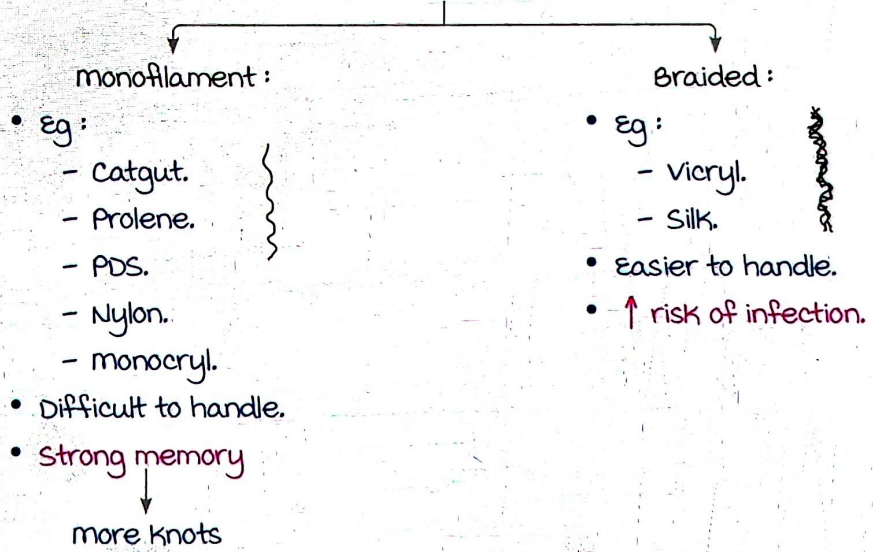
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Classification :

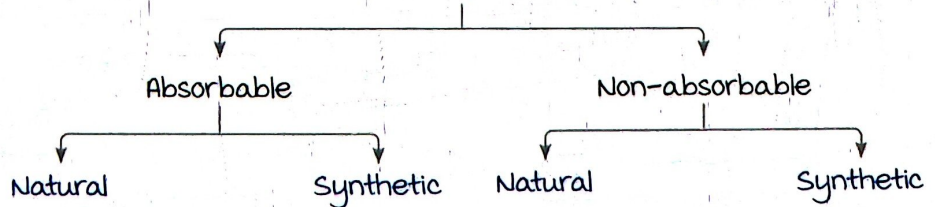
1.



2.



3.



Natural absorbable :

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

1. Catgut :

- Derived from submucosa of a sheep gut.
- Undergoes phagocytosis & enzymatic degradation within 7-10 days.

2. Chromic catgut :

- Tensile strength : 21-28 days.
- Complete absorption in 90 days.

Synthetic absorbable :

1. monocril (Poliglecaprone) :

- monofilament.
- Subcuticular : 3-0/4-0 cutting/reverse cutting needle.

2. Vicryl (Polyglactin) :

- Braided.
- Dissolves in 60-90 days.
- Uses :

- CBD : 5-0.
 - Bowel : 3-0.
 - Bladder : 3-0.
- } Round body.

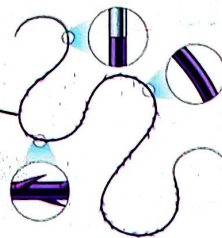
• Special types of vicryl :

a. Vicryl plus :

- Coated with antibiotic triclosan (↓ risk of infection).

b. Barbed vicryl :

- Thorns on suture.
- Used : Face lift Sx
- Disadvantage : Painful.



c. Vicryl rapide :

- Polyglactin 910.
- Rapidly dissolves : within 21-28 days.

3. Polydioxone (PDS) :

- monofilament.
- Dissolves : 180 days.

Uses : Same as vicryl + tracheobronchial repair.

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Natural non-absorbable :

1. Silk :

- Black, braided suture.
- Source : Silkworm.
- Uses :
 - Skin : 2-0/3-0 cutting.
 - Fix drain : No 1/1-0/2-0.
 - 2nd layer of bowel anastomosis : 3-0 round body.

Synthetic non-absorbable :

1. Prolene :

- Blue monofilament suture.
- Uses :
 - Hernia mesh.
 - Close abdominal sheath : Jenkin's rule : Length of suture $\geq 4 \times$ length of wound.
 - Vascular repair/anastomosis :
 - a. Aorta : 2-0.
 - b. Femoral artery : 4-0.
 - c. Popliteal artery : 6-0.

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2. Nylon/Ethilon :

- monofilament suture.
- Uses :
 - Skin suture.
 - Cataract Sx : 10-0.
 - Nerve & tendon repair.

3. Steel suture :

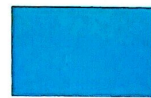
- Uses : Sternotomy incision following CABG.

4. Polyester/Ethibond :

- Uses :
 - Rectus sheath.
 - Tendon repair.

5. Polybutester :

- Uses : Plastic Sx (Rarely used).



Suture removal :

For non-absorbable sutures.

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Duration :

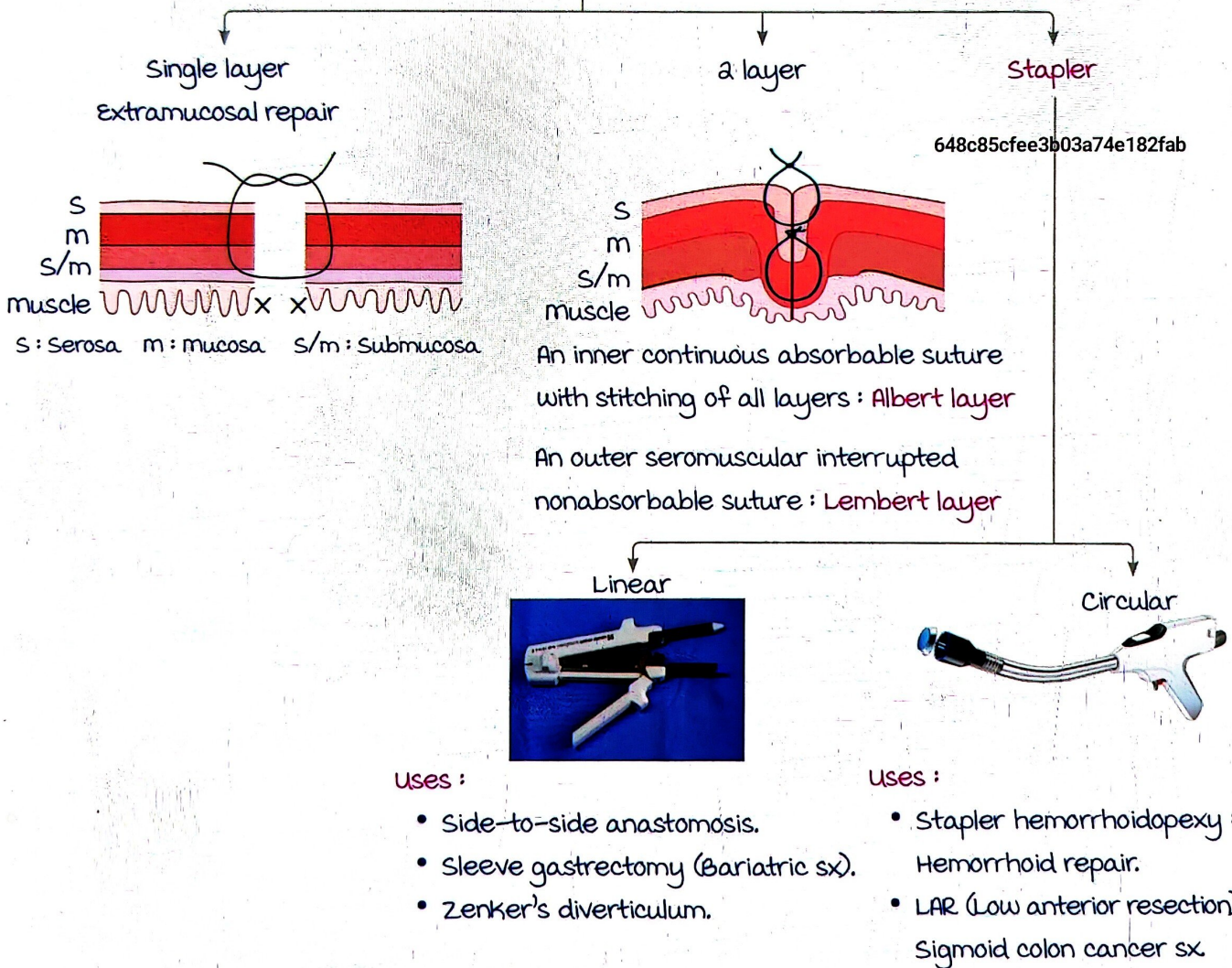
- Scalp : 5-7 days.
- Neck : 5-7 days.
- Abdomen : 12-14 days.
- Face : 3-5 days (Earliest).
- Thorax : 10-12 days.
- Perineum : 10-12 days.

BOWEL ANASTOMOSIS

- Inverted Edges.
- **Strongest layer** : Submucosa.

Techniques :

Same result despite technique used



Cheate's split : Longitudinal split along anti mesenteric border → Enlarges lumen for end-to-end anastomosis.

Canal loop : Taken at edge of anastomosis → Ensures bowel inversion.

Feedback

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

POST-OPERATIVE FEVER AND WOUND INFECTION

Post operative fever

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CAUSES

Post op day (POD)	Causes
1	<ul style="list-style-type: none"> Atelectasis (m/c on POD 1)
2-3	<ul style="list-style-type: none"> Pneumonia Superficial thrombophlebitis UTI (m/c cause of hospital acquired infections)
4-5	<ul style="list-style-type: none"> Surgical site infections (SSI)/wound infection Deep vein thrombosis
6	<ul style="list-style-type: none"> Burst abdomen/Abdominal wound dehiscence
7 & beyond	<ul style="list-style-type: none"> Intra-abdominal wound infection/collections

Pneumonia :

Clinical features : Fever.

Rx : Antibiotics.

Superficial thrombophlebitis :

Clinical features : Pain, fever.

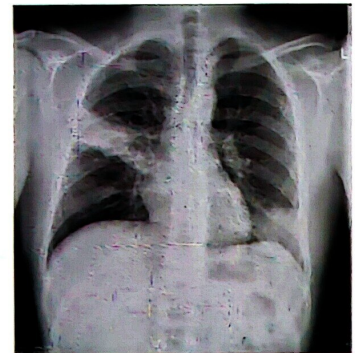
Rx : Topical heparinoids.

Atelectasis :

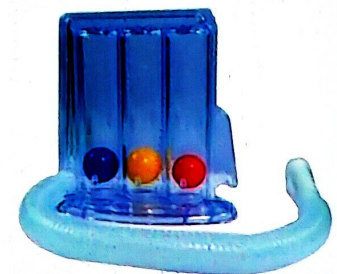
- Collapse of alveoli.
- m/c cause of post op fever on day 1.

Prevention :

- Chest physiotherapy : Incentive spirometer.
- Pain control.
- Treat congestive heart failure (CHF) & chronic obstructive pulmonary disease (COPD) before Sx.
- Steam inhalation.
- Cessation of smoking 4-6 weeks prior to Sx.



CXR-Pneumonia



Incentive spirometer

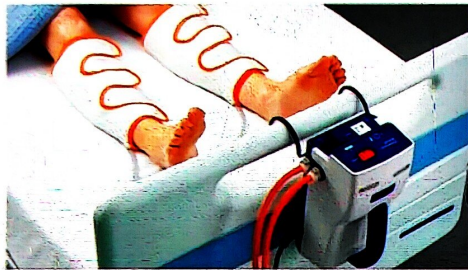
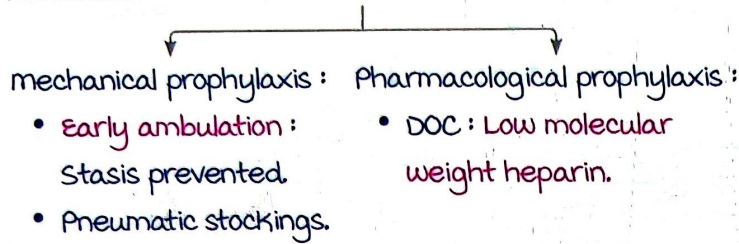
Deep vein thrombosis (DVT) :

Clinical features :

- w/L.
- Lower limbs > upper limbs.
- Swelling & pain.

Ix : Duplex scan (IOC).

Prevention :



Pneumatic anti DVT stockings

Connected to machine



Pneumatic compression stocking : No numbering present on it

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

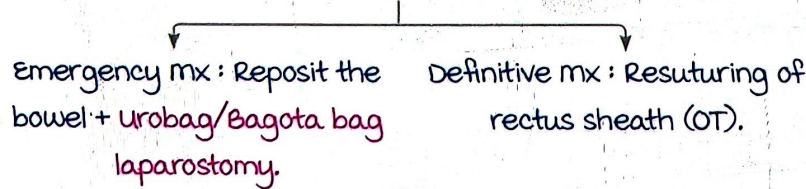
Burst abdomen/Abdominal wound dehiscence

- Abdominal Sx → Rectus sheath opens up → Direct visualization of bowel.

Clinical Features :

- Cough on POD 6.
- Dressing soaked with reddish fluid.
- Serous/salmon fluid sign.

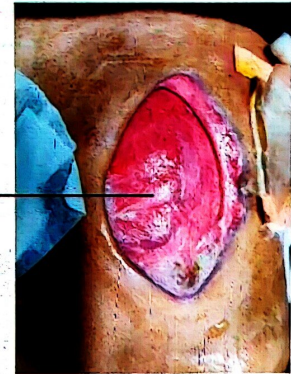
mx :



Factors predisposing to burst abdomen :

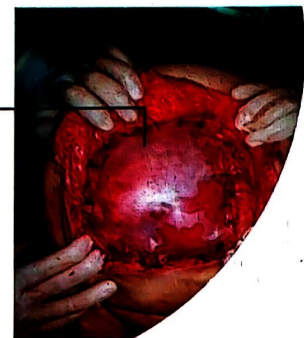
- Patient factors :
 - Chronic cough.
 - Constipation.
 - Infection.
 - Obesity.
 - Immunocompromised.
 - malnourished.

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Bowel

Burst abdomen



Urobag sutured with skin sheath

Urobag/Bagota bag laparostomy

Feedback