

Surgery

Marrow Edition 8

Volume - 1

MARROW

Instructions

- Notes are to be used in conjunction with Marrow videos.

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PATIENT SAFETY, OT ZONES AND SURGERY POSITIONS

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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



Narrow ← ————— Wide

Color-coding of IV cannulas

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

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SURGICAL SAFETY CHECKLIST

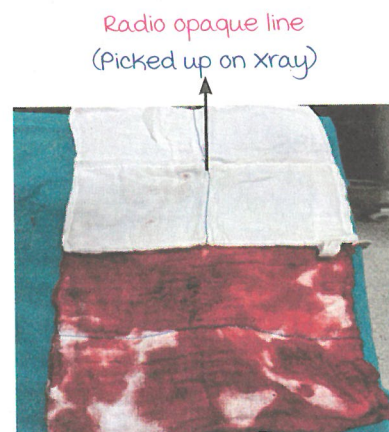
Before induction of Anaesthesia (Ward to OT complex)	Before skin incision	Before Patient leaves operating room
Sign in	Time out	Sign out
1. Patient has confirmed : <ul style="list-style-type: none"> • Identity • Site (marked) • Procedure • Written consent 	1. Confirm : <ul style="list-style-type: none"> • Patient site • Procedure name • Time 	1. Instruments, sponge & needle count
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.



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.

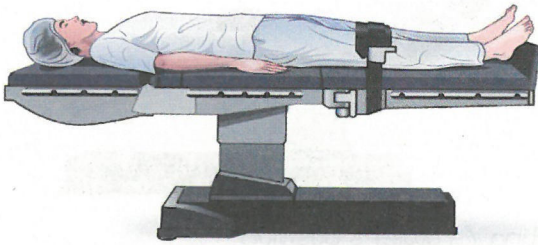
2. Clean Zone (Connects protective zone to aseptic zone) :

- Equipment store room.
- maintenance workshop.

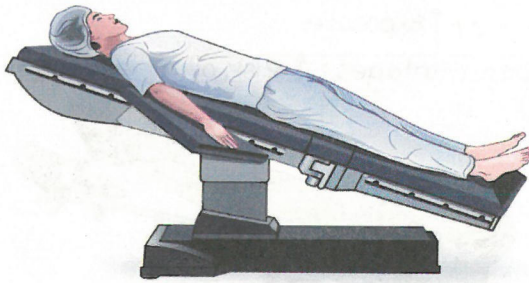
3. Aseptic zone : OT

4. Disposal zone.

OT POSITIONS



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

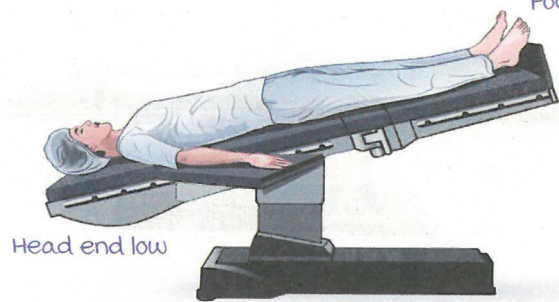
5. Lateral or Kidney position :

Uses :

- Thoracotomy.
 - Pyelolithotomy.
 - Nephrolithotomy.
 - Nephrectomy.
 - Breast reconstruction : Latissimus Dorsi Flap
- Increased risk for brachial plexus injury (D/t hyperextended arm).

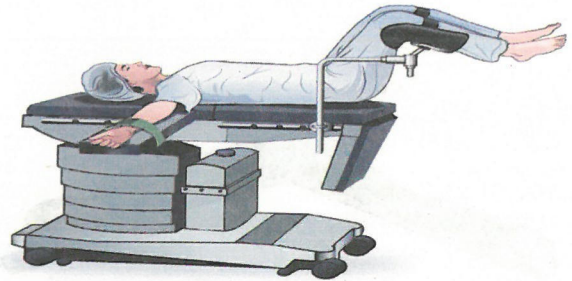
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Foot end up



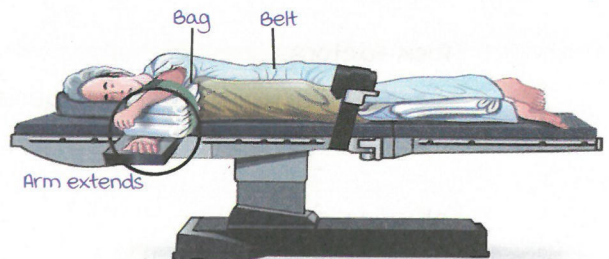
Head end low

2. Trendelenberg position :
Used in Pelvic surgeries



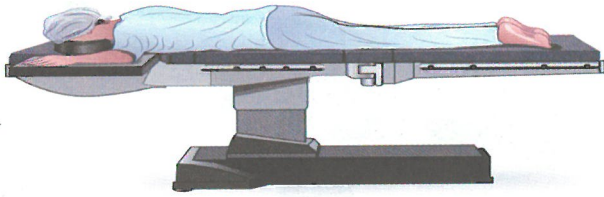
4. Lithotomy

- uses :
 - Obstetric procedures.
 - Gynecologic procedures.
 - urologic procedures (TURP).
 - Hemorrhoid Surgeries.
- Nerve injured if legs are not supported properly : Common peroneal nerve.



Arm extends

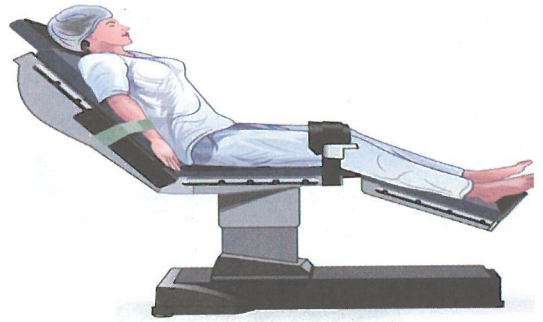
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6. Prone position :

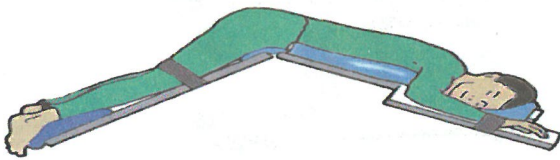
uses :

- Spinal surgery
- Pilonidal sinus surgery.



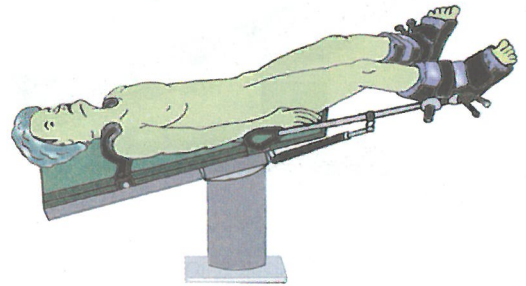
7. Sitting / Fowler's position :

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



8. Jackknife position :

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



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 :

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

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

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

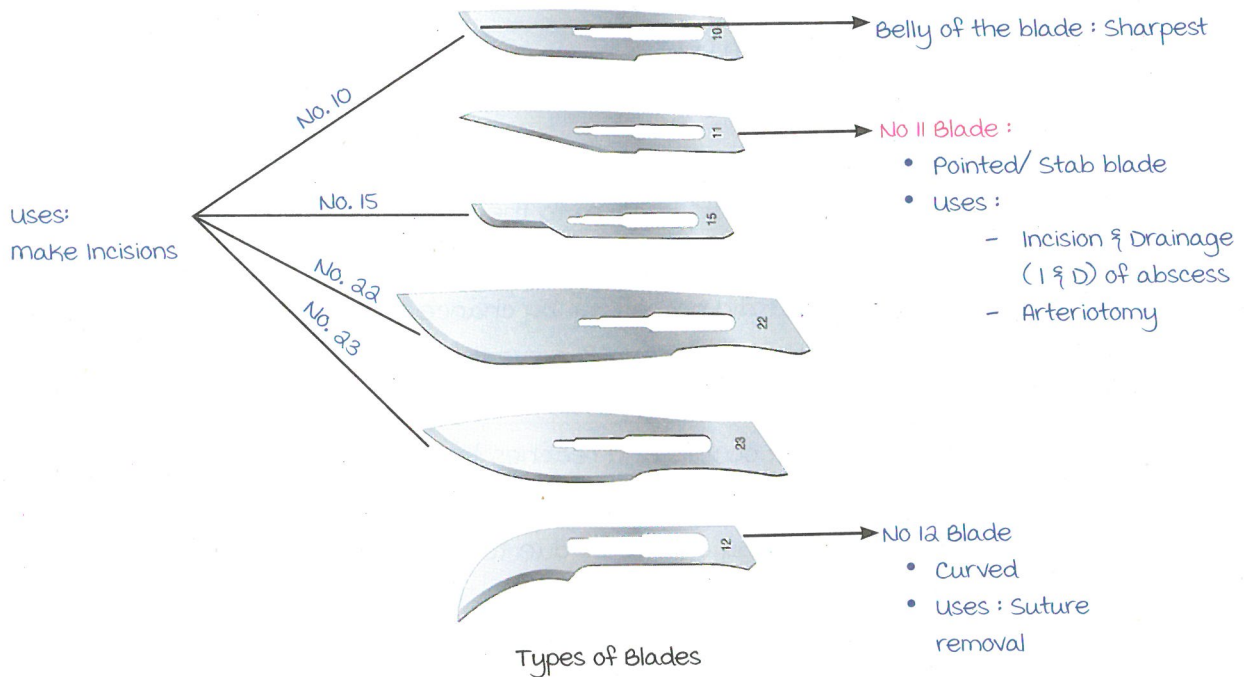
An adverse event	An incident that results in harm to the patient
A near miss	An incident that could have resulted in unwanted consequences but did not, either by chance or through a timely intervention preventing the event from reaching the patient
A no-harm event	<ul style="list-style-type: none"> •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

SURGICAL BLADES AND ENERGY SOURCES

Types of Blades & Incisions

00:00:42

BLADES



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



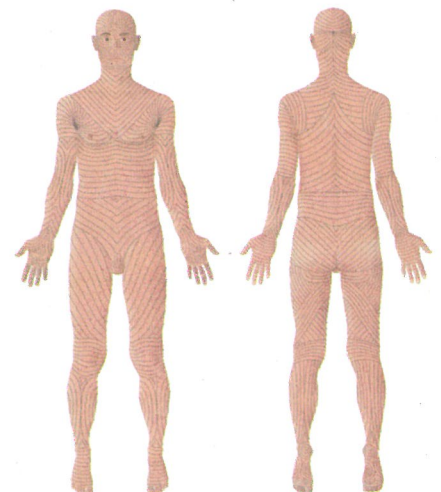
BP Handle

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

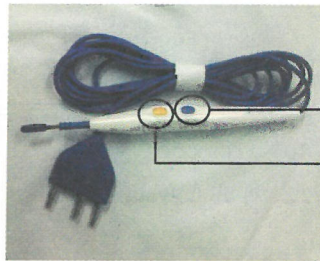
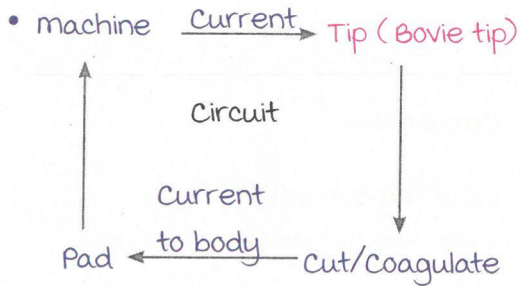
Bleeding Control

00:08:00

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ENERGY SOURCES

1. Monopolar Cautery :



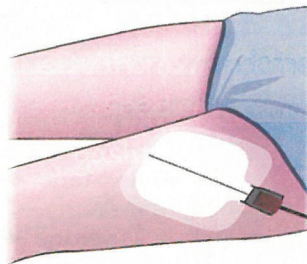
Coagulation

Cutting

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



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.
- ↓
- Current runs to base.

Avoid close to end arteries.

Uses :

- Cutting
- Coagulation

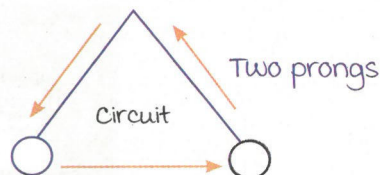
Avoided in :

- CNS Sx
- Parotid/Thyroid Sx
- Ear lobule
- Penile region
- Patient with Pacemakers.

a. Bipolar cautery :



- Circuit completed locally.



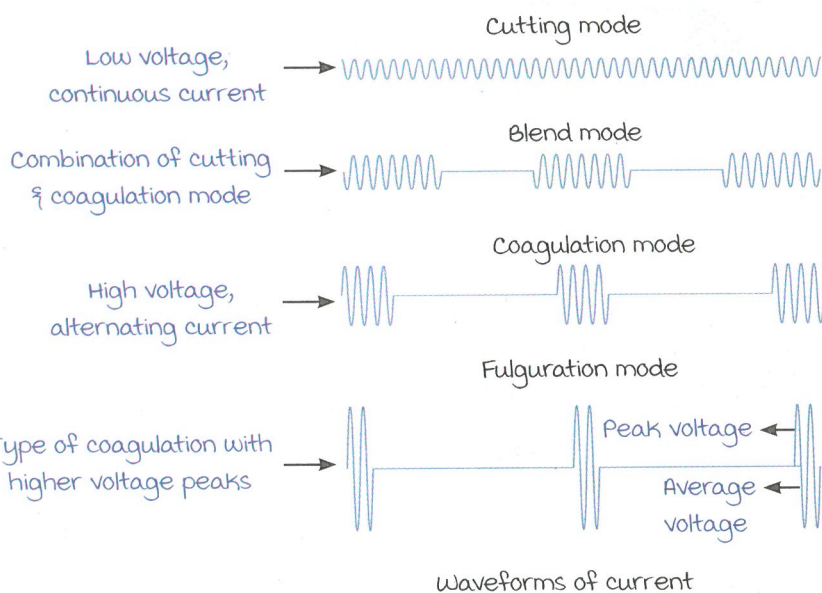
----- Active space -----

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.

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 :

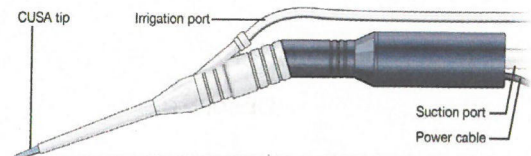
- Can be used close to vital structures.
- Precise cuts.
- Cut through scar tissue.

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.



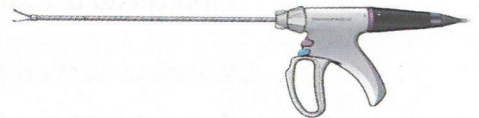
Cavitron Ultrasonic Surgical Aspirator (CUSA)

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.

SURGICAL DRAINS, KNOTS AND SUTURES

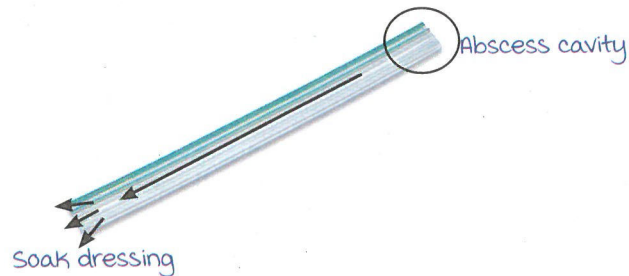
Drains & Knots

00:01:21

DRAIN TYPES

Open :

Obsolete.

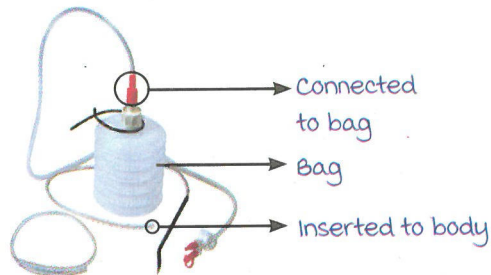


Closed :

Empty into a container/bag.

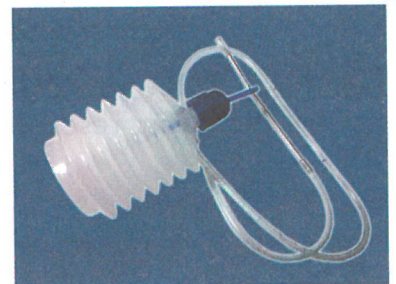
1. Romovac suction drain :

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



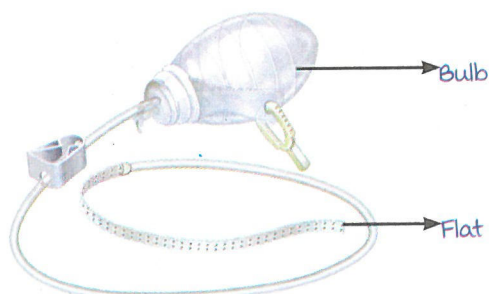
2. minivac drain :

Used after sentinel LN biopsy.



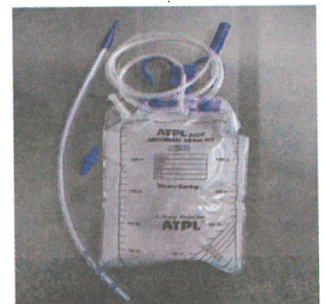
3. Jackson Pratt drain :

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



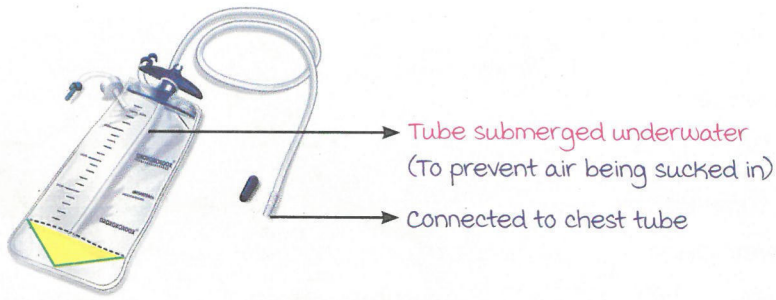
4. Abdominal drain :

Closed drain, no -ve pressure.



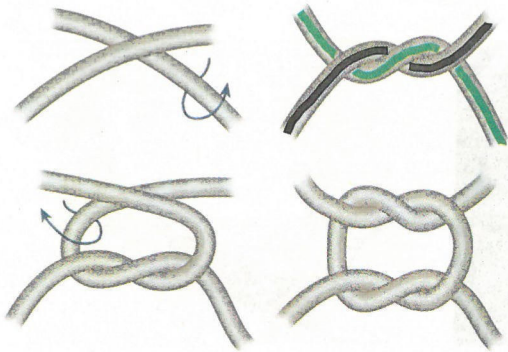
5. underwater seal bag :

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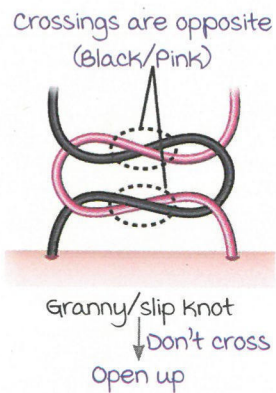


KNOT TYPES

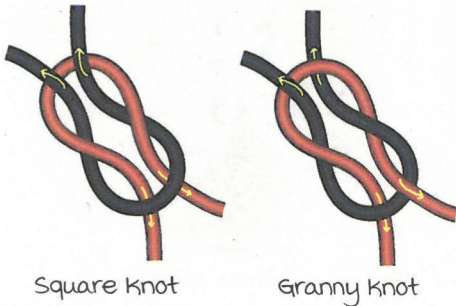
Square/Reef knot : most basic knot.



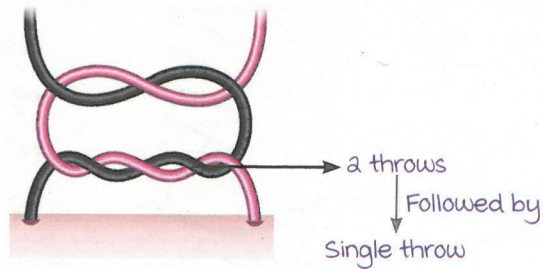
One square throw
↓
Followed by
Another square throw



Granny's v/s Reef knot :



Surgeon's knot :

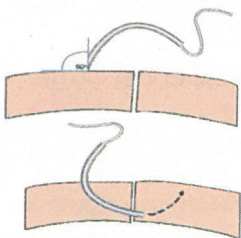


Sutures

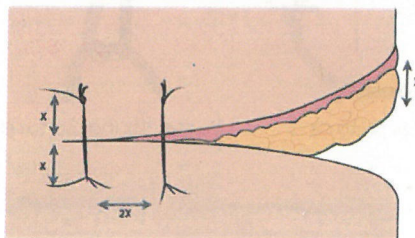
00:11:55

SKIN SUTURING

- Everted edges.
- Enter skin at 90°.



Principles of suturing :



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

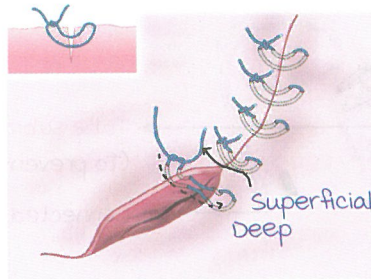
Types :

1. Simple suture :

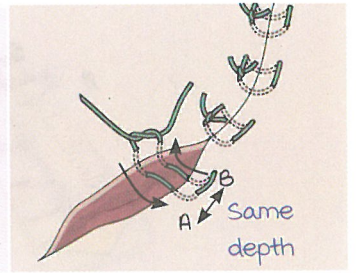
Fail to cause
eversion

2. mattress suture :

- Cause eversion.
- Hemostasis.

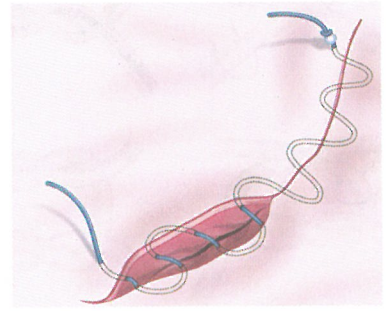
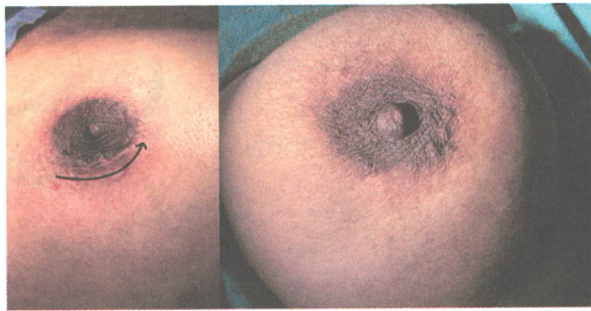


Vertical mattress

Horizontal mattress :
Least cut through rate

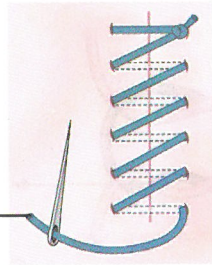
3. Subcuticular sutures :

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

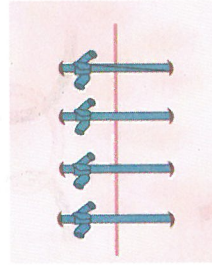


4. Other sutures :

Aberdeen's/Cobbler's
knot for closure



Continuous suture

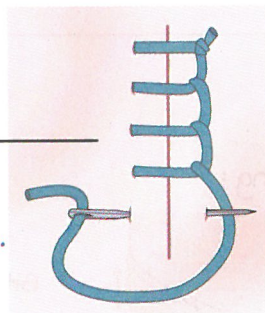


Interrupted suture

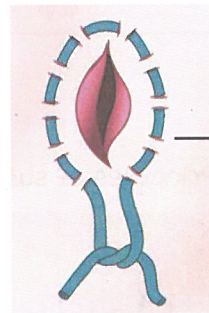


Buried mattress suture

- Continuous suture with locking.
- Distribution of tension.



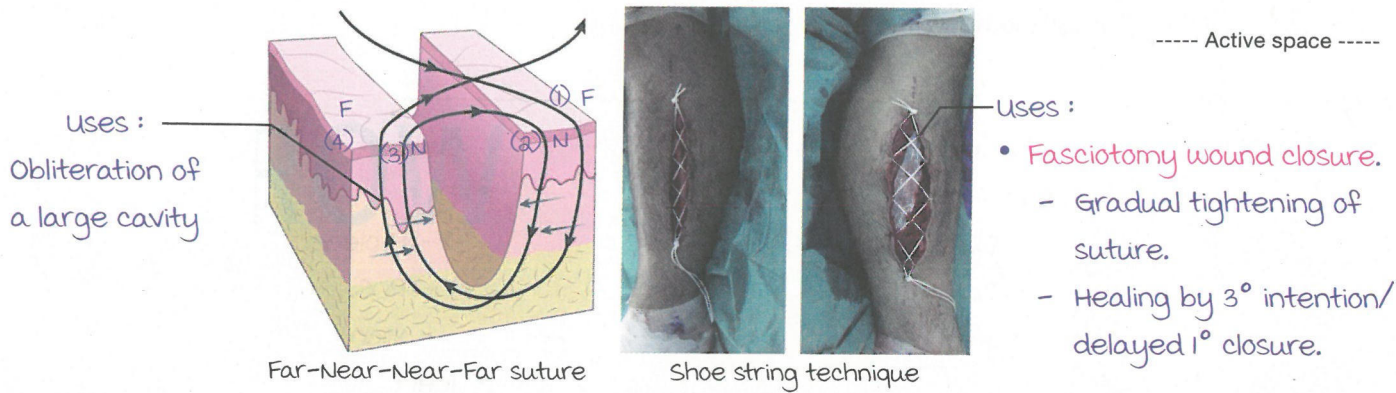
Lock suture



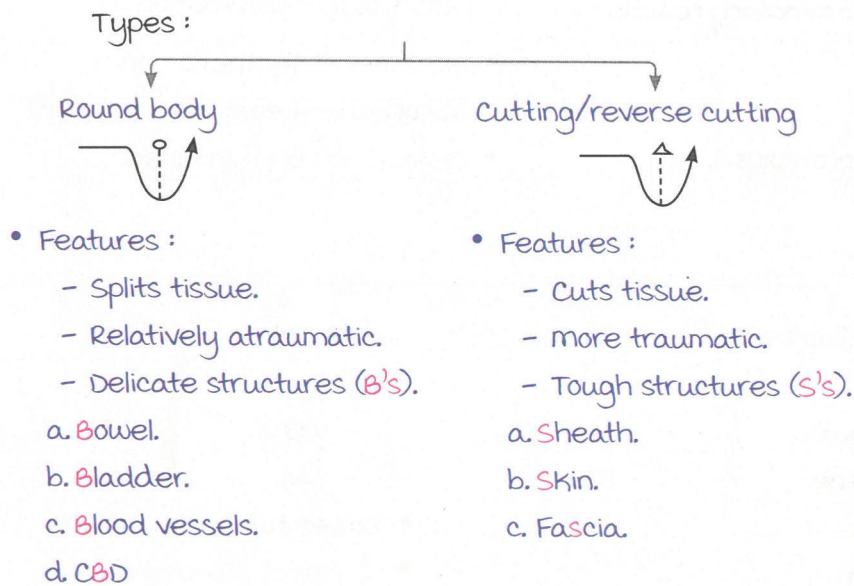
Purse string Suture

uses :

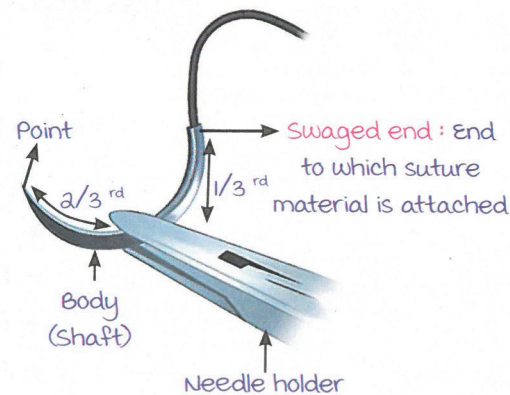
- Bury appendicular stump.
- Cervical encirculation.



Needles :



Parts :



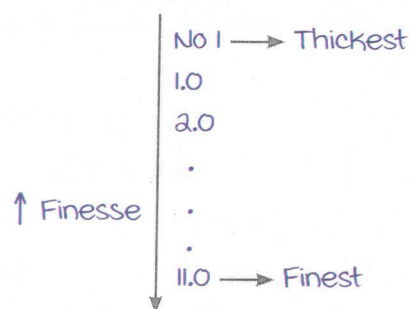
SUTURES

Suture color coding :

Color	Suture type
Brown	Catgut
Violet	Vicryl
Blue	Prolene
Black	Silk

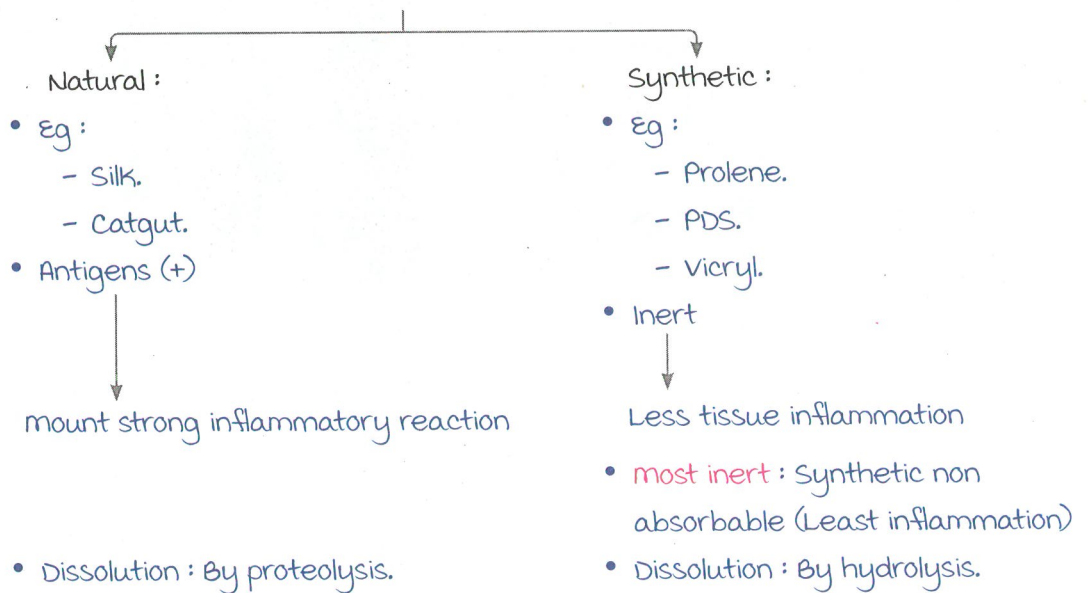
Suture numbering :

- Suture diameter = $1/10^{\text{th}}$ of a mm.

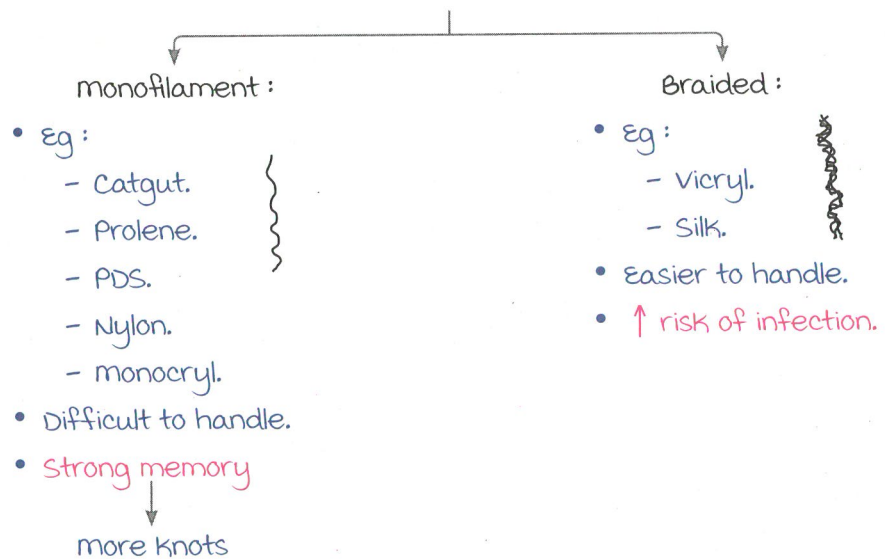


Classification :

1.



2.



3.

