Surgical Drains

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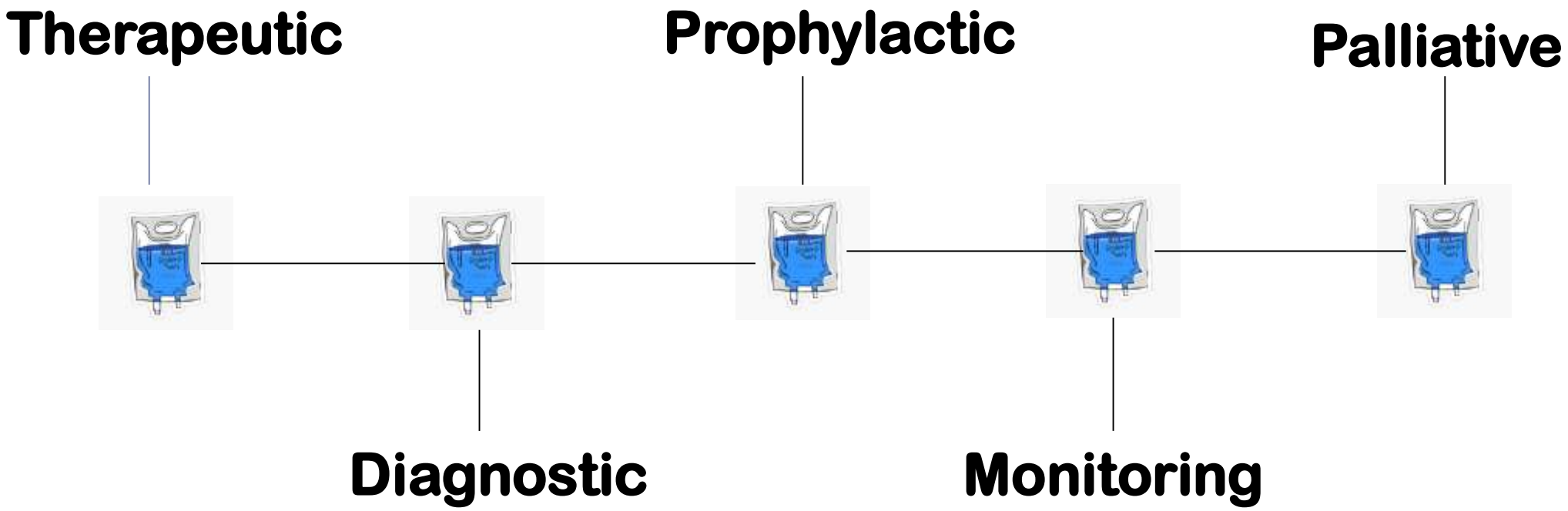
WHAT IS A SURGICAL DRAIN ?

- Tubes used to remove pus, blood or other fluid, preventing it from accumulating in the body.
- Drains inserted after surgery don't result in faster wound healing but are sometime necessary to drain body fluid which may accumulate and in itself become a focus of infection.
- The type of drainage system inserted is based on the needs of patient, type of surgery, type of wound, amount of drainage expected and surgeon preference.

INDICATIONS :



Classification of Drains :

Basis	Type	
Rationale	Prophylactic	Therapeutic
Mechanism	Passive	Active
Disposition	Open	Closed
Nature	Tube	Sheet
Location	Internal	External

Types of drains:

Active vs passive drains

Closed vs open drains

OPEN VS CLOSED

OPEN

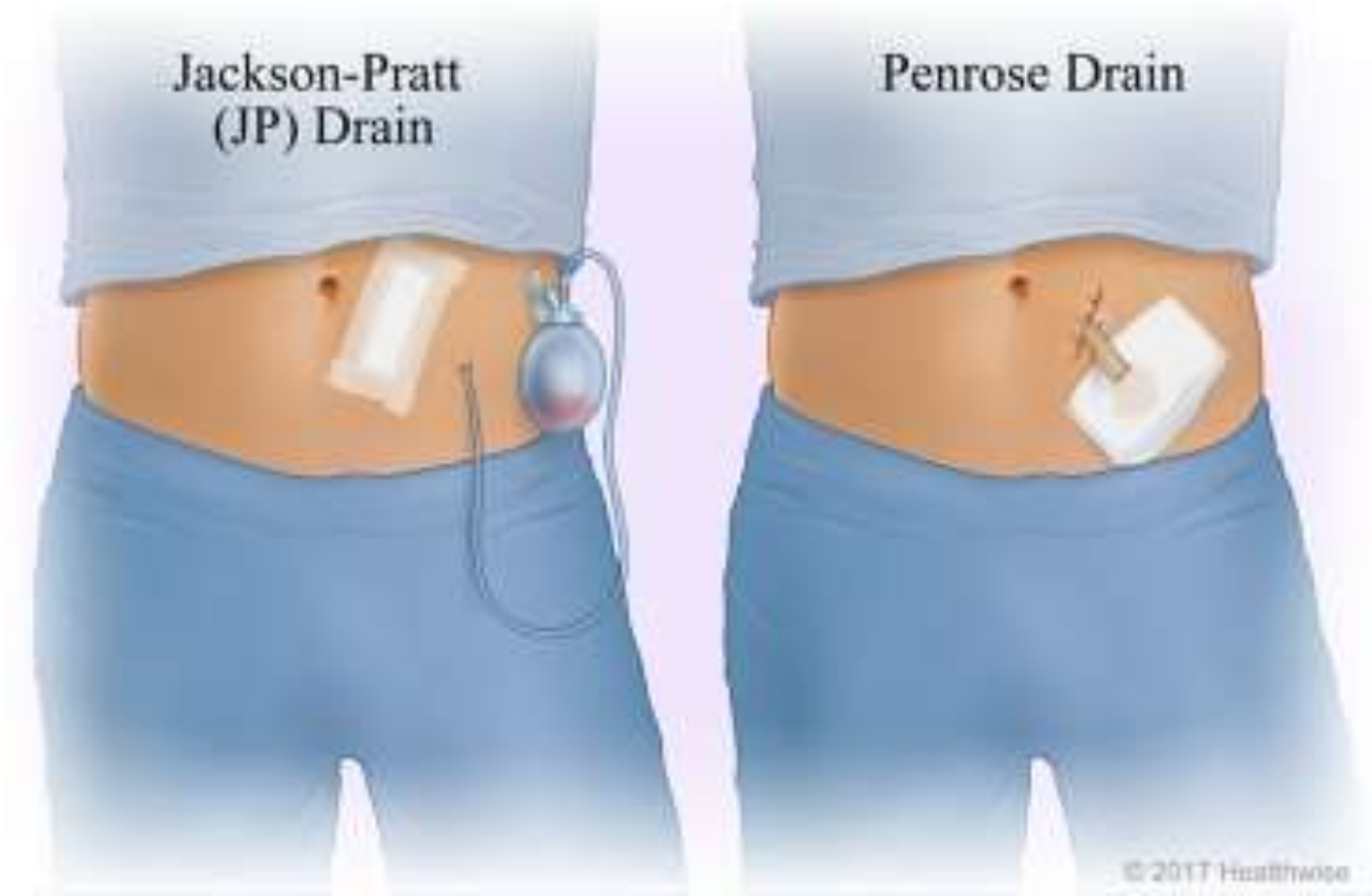
- Drains empty directly to the exterior into the overlying wound dressing or stoma bag.(connect to the outer atmosphere)
- It is often difficult to measure the effluent
- Increased risk of infection .

- E.G:
- Corrugated drain.
- Penrose drain.
- Gauze wick drain.

CLOSED

- Those drain externally into sealed container or reservoir.
- Lower risk for infection.
- Easier to care.
- Accurate assessment of fluid drainage.

- E.G:
- Redivac (hemovac) drain.
- Jackson pratt drain.
- Chest drain .


Jackson-Pratt
(JP) Drain
Penrose Drain
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Active VS Passive

ACTIVE DRAINS : (continuous negative pressure- High/Low)

Maintained under suction force, regardless of the pressure difference existence.

There are two types of active drains:

- **Closed (Jackson-pratt, hemovac drain)**
- **Open (Sump drain]**

Advantage:

1.less risk of infection

2. can be used anywhere (not dependent on gravity)

Disadvantage:

1.Causes tissue injury due to high negative pressure

2.Prevent fistula closure

3. Drain clogged by tissue

Active VS Passive

PASSIVE DRAIN

- **Passive drains have no suction.**
- **Drains by capillary action, pressure gradient or gravity**
- **Passive drains rely on gravity, body movement, pressure differentials, or overflow to move fluid or gas**

There are two types of passive drains:

- **Closed (NG tube, Under water seal drain)**
- **Open(Penrose, corrugated drain, gauze wick drain)**

Advantage:

1. less commonly obstructed.
2. Less injury

Disadvantage:

1.i. Gravity dependent affects location of drain

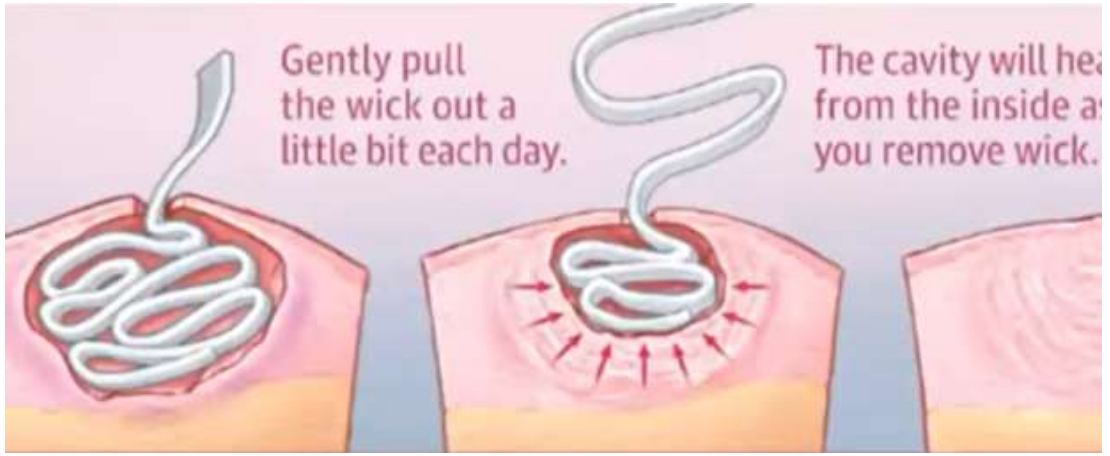
2. Higher risk of infection

	Active drains	Passive drains
Function	Works by active suction	Depends on pressure differentials
Pressure gradient	Negative pressure (low , moderate , high)	Positive pressure
Drain exit site	Dependent position not necessary	Dependent position necessary for best function
Obstruction of drain	More common due to smaller caliber	Less common
Retrograde infection	Lower incidence especially with close suction system	High incidence especially with open suction system

Open passive drains:

GAUZE WICK:

Usage:
Discharging sinuses
Abscess cavity



Open passive drains:

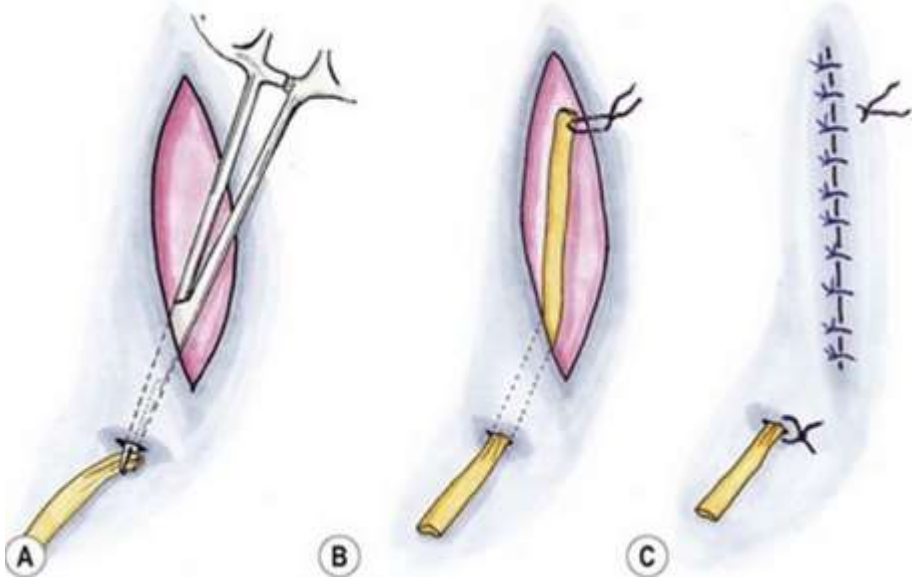
CORRUGATED DRAINS:

Open passive drains:

PENROSE DRAINS:

It is empties into an absorptive dressing material.

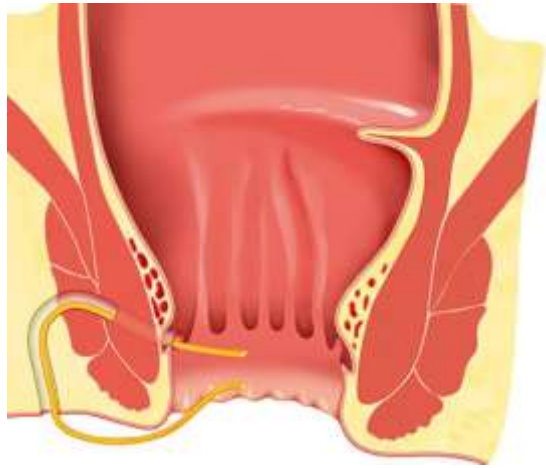
Soft and flexible.

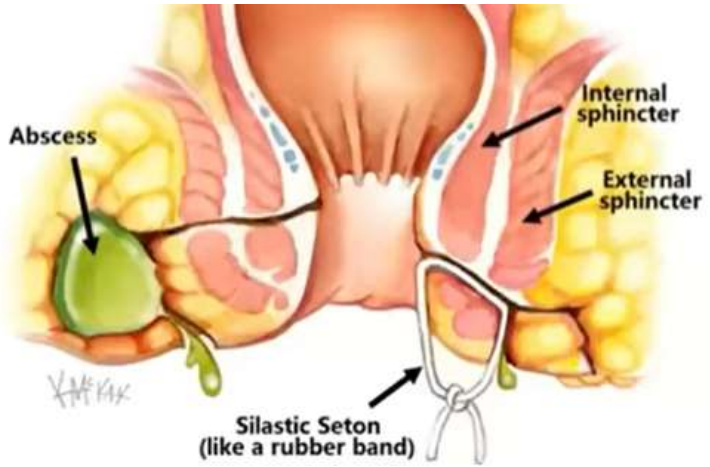


Open passive drains:

SETONS DRAIN:

Used for fistulas.



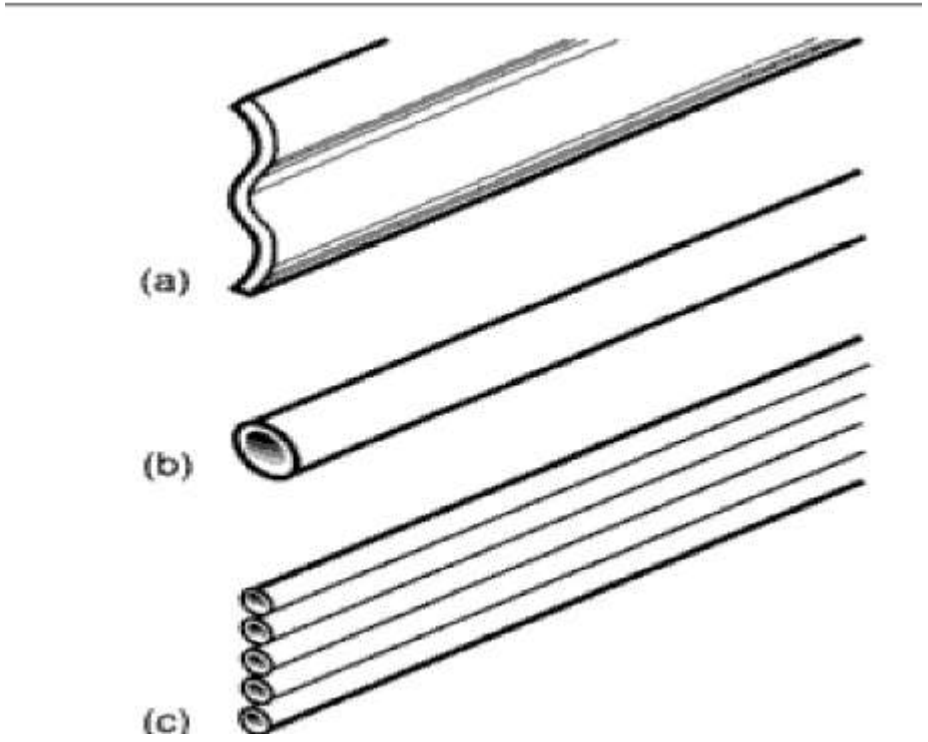


Open passive drains:

YATES DRAIN:

Parallel tubes, act by capillary action.

Let's match them



A- corrugated drain.

B- Penrose drain.

C- yates drain.

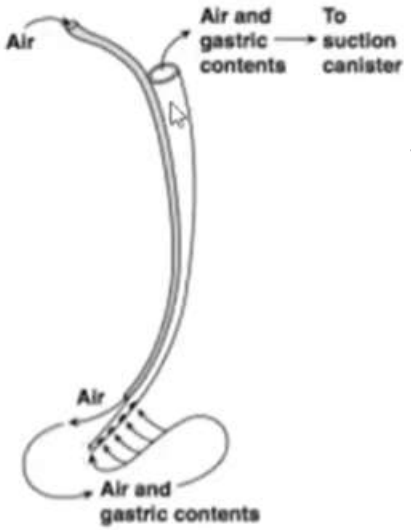
Closed passive drains:

ROBINSON DRAIN:

Used for anticipated fluid collection into a bag like to prevent seroma formation after a surgery.

e.g. pelvic surgery, abdominal surgery.

Open Active drains:



SUMP DRAIN:

1st lumen for suction drainage.
2nd lumen is air vent
to prevent the blockage in the suction lumen

Closed Active drains:

- REDIVAC:

Closed suction drainage system depends on negative pressure.
Used for Drainage of the wound to prevent anticipated collection.

Closed Active drains:

JACKSON PRATT DRAIN:

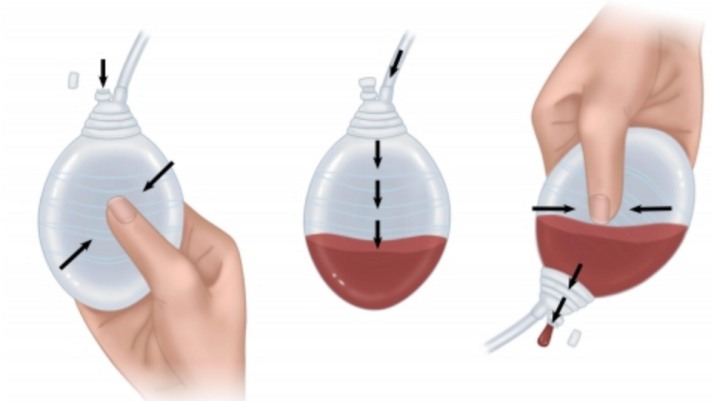
Used for removing fluids that build up in an area of the body after surgery, depending on negative pressure.

Common uses in:

Abdominal surgery.

Mastectomy.

Thoracic surgery.



Complications of Drains

-pain
-irritation
-bleeding
-displacement
-perforated or injury to adjacent structures
-OCCLUSION
-infection
-leaking around drain
-loss of fluid , electrolytes and proteins

Removal of drains

Generally, drains should be removed once the drainage has stopped or output becomes less than about 25 ml/day . Drains can be 'shortened' by withdrawing them gradually (typically by 2 cm per day) and so, in theory, allowing the site to heal gradually

Special Drains

CHEST TUBE

- **These are indicated for a pneumothorax, pleural effusion, haemothorax or to prevent the collection of fluid or air after thoracotomy.**

How it works :

-expiratory pressure from the patient helps push air and fluid out of the chest (cough, Valsalva Manuer)

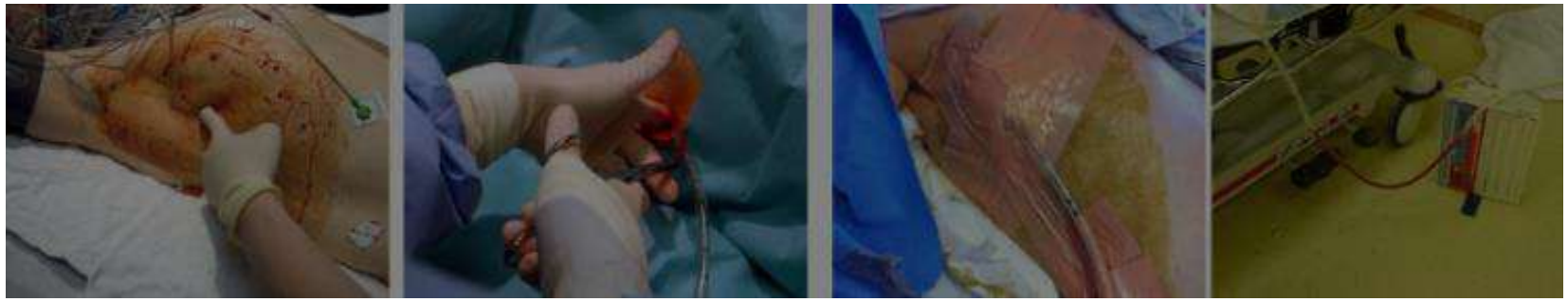
-Gravity helps fluid drainage as long as the chest drainage system is below the level of the chest

-Suction can improve the speed at which air and fluid are pulled from the chest

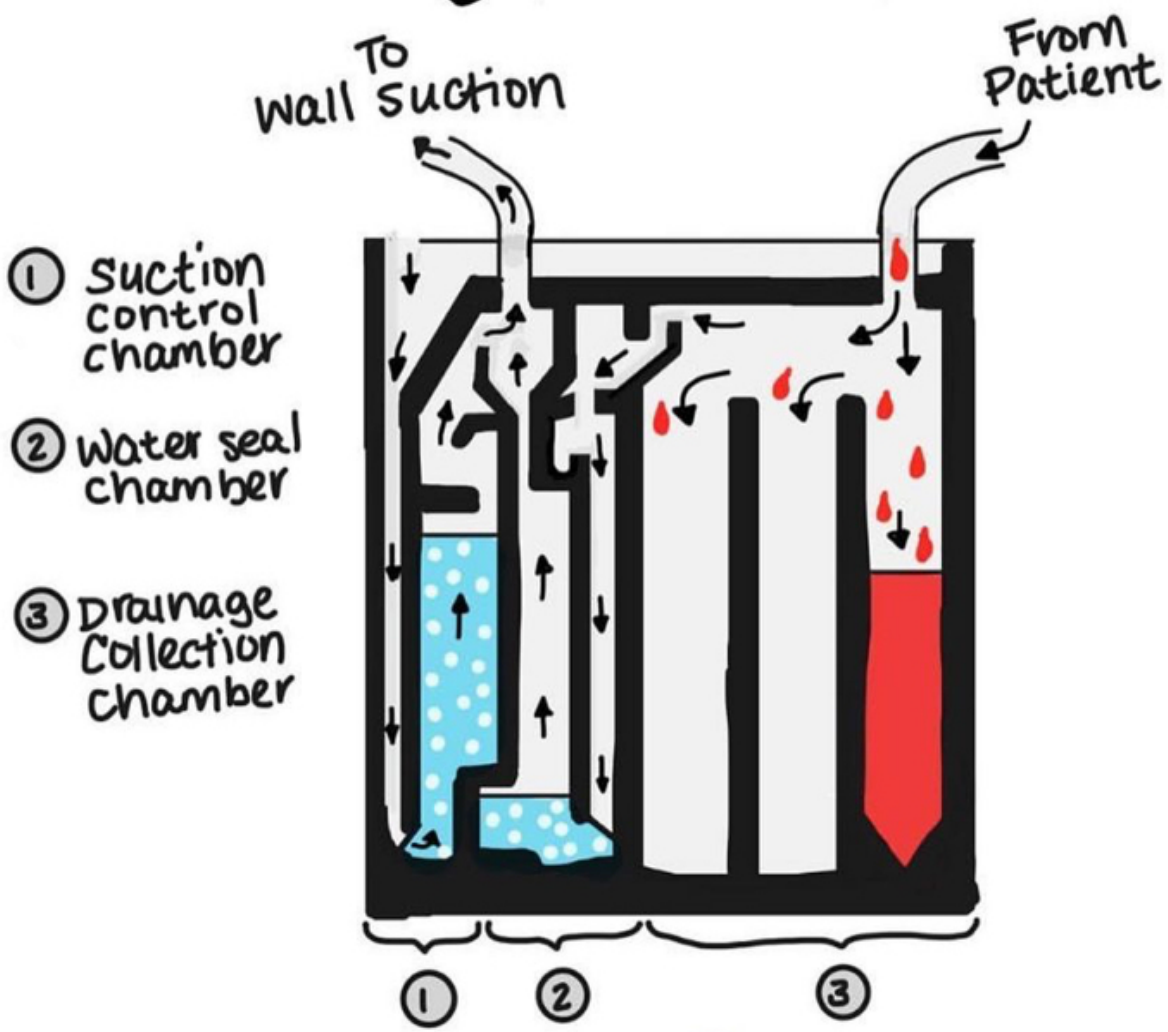
For pneumothorax, the tube is usually inserted in the 4th intercostal space, and for other indications in the 5th intercostal space, in the mid-axillary or anterior axillary line. Mark the insertion site direct it inferoposteriorly for effusions, or apically for pneumothorax, until all of the tube's holes are inside the chest wall.

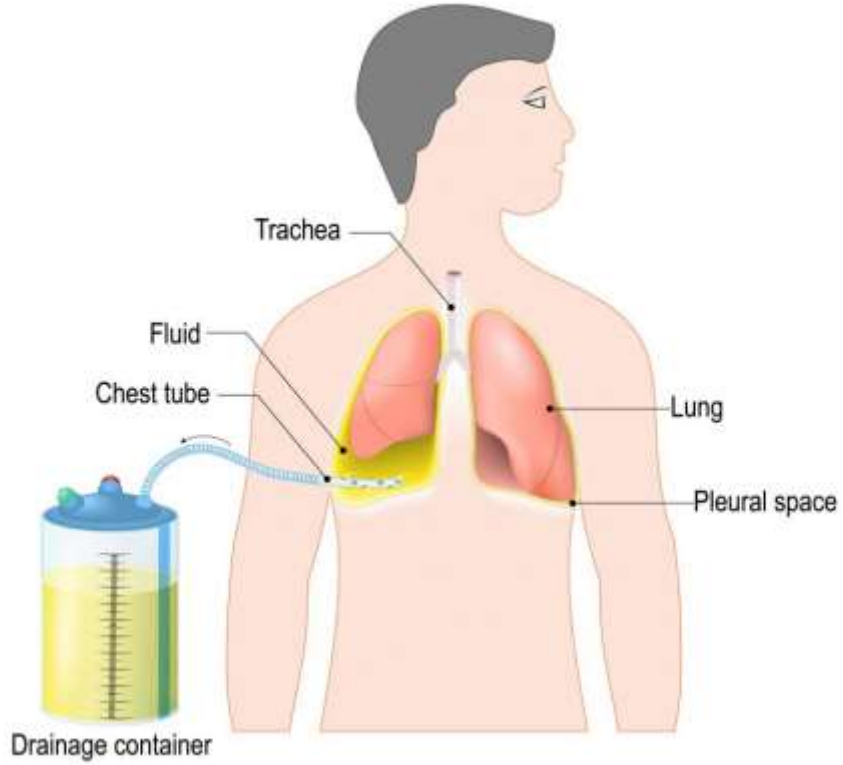
Contraindication :

- **Bleeding diathesis**
- **Cardiac temponade**
- **Coagulopathy**
- **atelectasis**



Chest Tube Chambers





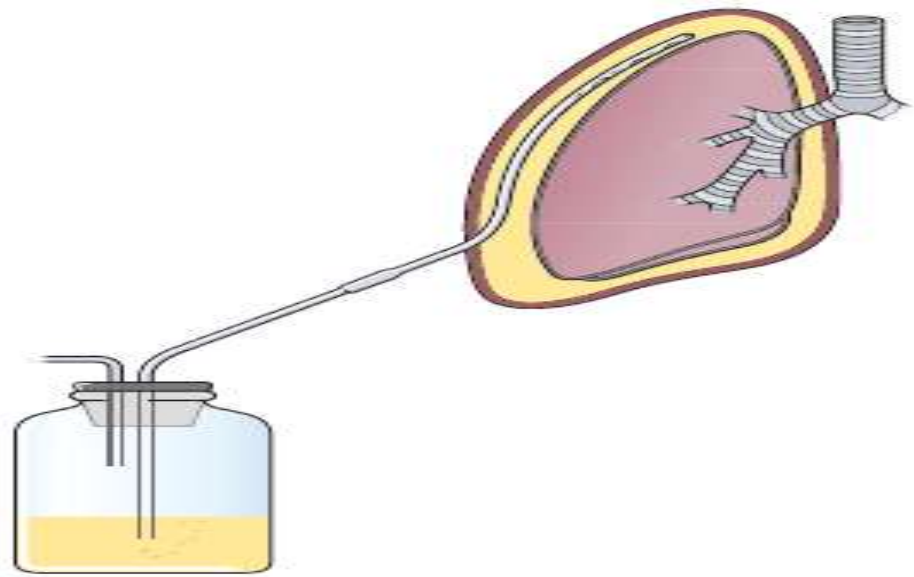
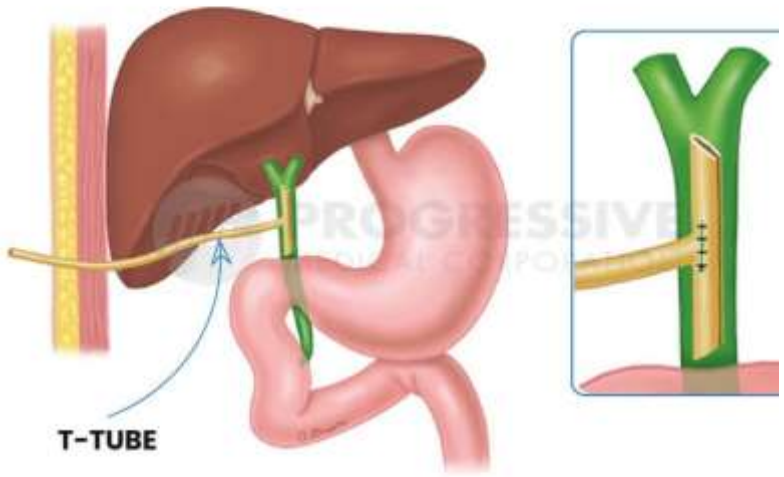


Figure 4.17 Underwater seal chest drain. Reproduced with permission from Thomas WEG. Basic principles. In: Kingsnorth A, Majid A (eds). *Principles of surgical practice*. London: Greenwich Medical, 2001.



T-TUBE

T tube: a tube consisting of a stem and a cross head is placed in to the common bile duct while the stem is connected to a small pouch (i.e. bile bag)

After exploration of the common bile duct, a T-tube may be inserted into the duct which allows bile to drain while the sphincter of Oddi is in spasm postoperatively.

Once the sphincter relaxes, bile drains normally down the bile duct and into the duodenum.

THANK YOU

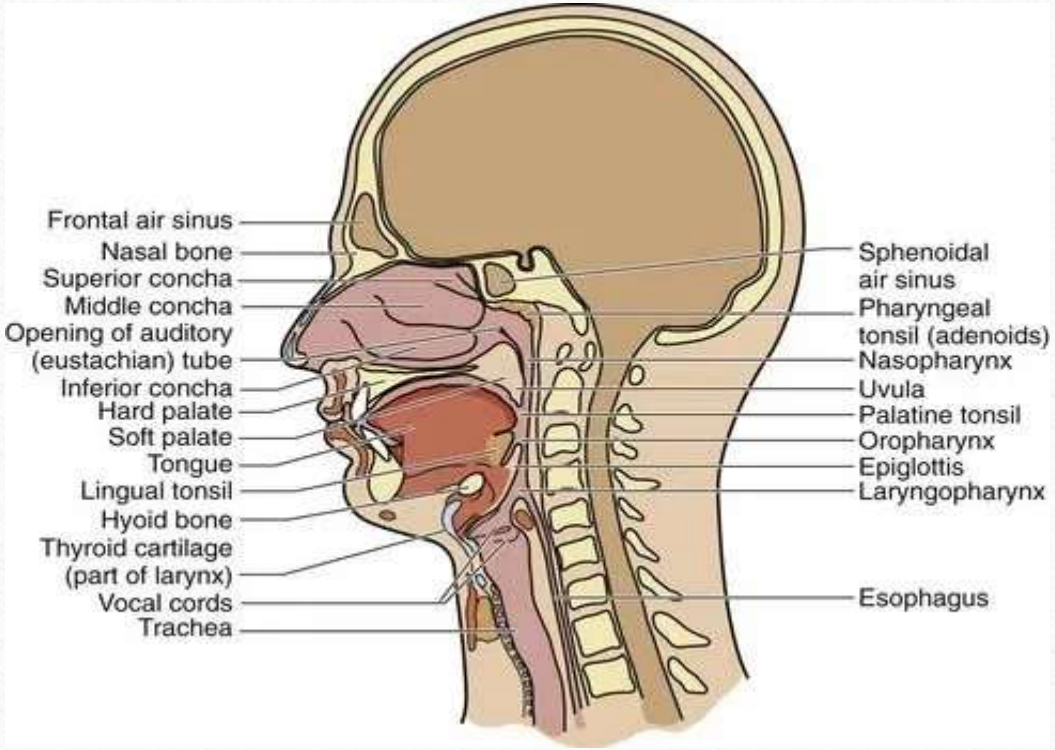
Gastrointestinal Intubation

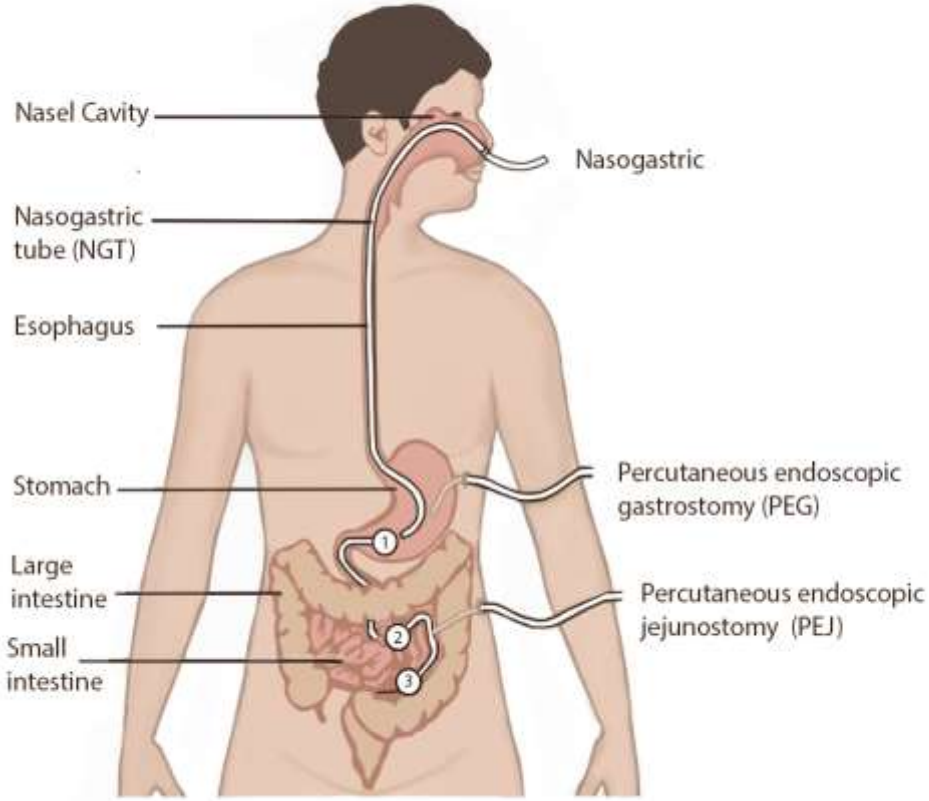
Nasogastric tube (NG tube)

Made by :

Mohammed Ghawanmeh

Anatomy


Frontal air sinus
Nasal bone
Superior concha
Middle concha
Opening of auditory (eustachian) tube
Inferior concha
Hard palate
Soft palate
Tongue
Lingual tonsil
Hyoid bone
Thyroid cartilage (part of larynx)
Vocal cords
Trachea
Sphenoidal air sinus
Pharyngeal tonsil (adenoids)
Nasopharynx
Uvula
Palatine tonsil
Oropharynx
Epiglottis
Laryngopharynx
Esophagus


Nasel Cavity
Nasogastric
Nasogastric tube (NGT)
Esophagus
Stomach
Percutaneous endoscopic gastrostomy (PEG)
Large intestine
Percutaneous endoscopic jejunostomy (PEJ)
Small intestine
1
2
3

Nasogastric tube:

A tube that is passed through the nose and down through the nasopharynx and the esophagus into the stomach .

NG tube is commonly used for patients who :

- Need a mechanical ventilator to breath.
- Have an intestinal obstruction.

Indications for GI intubation:

Diagnostic indications for NG intubation include the following:

- **Evaluation of upper gastrointestinal (GI) bleeding (ie, presence, volume)**
- **Aspiration of gastric fluid content**
- **Identification of the esophagus and stomach on a chest radiograph**
- **In babies coughing, choking or a baby turning blue when trying to feed**
- **Administration of radiographic contrast to the GI tract**
- **Identification of cancer cells**

Therapeutic indications for NG intubation include the following:

*Relief of symptoms and bowel rest in the setting of small-bowel obstruction
•Gastric decompression, including maintenance of a decompressed state after endotracheal intubation, often via the oropharynx.
•Aspiration of gastric content from recent ingestion of toxic material
•Administration of medication
•Feeding
•Bowel irrigation
•NG tube can be kept following corrosive ingestion for the development of a tract in
the esophagus that subsequently can be used for balloon dilatation
Absolute contraindications for NG intubation include the following:
•Severe maxillofacial trauma
•Recent nasal surgery
•Nasopharyngeal or esophageal obstruction
•Esophageal abnormalities such as diverticulum
Contraindications for GI intubation

Contraindications for GI intubation

Absolute contraindications for NG intubation include the following:

- **Severe maxillofacial trauma**
- **Recent nasal surgery**
- **Nasopharyngeal or esophageal obstruction**
- **Esophageal abnormalities such as diverticulum**

Relative contraindications for NG intubation include the following:

- Coagulation abnormality
- Esophageal varices or stricture
- Recent banding of esophageal varices
- Anastomosis in the esophagus and the stomach - Blind NG tube insertion has traditionally been contraindicated in certain procedures involving these anastomoses because of the fear of damage to the staple line; however, in an animal study of blind NGT advancement after sleeve gastrectomy performed via a flexible gastroscope, Fabian et al observed no sign of trauma to the staple line and
no significant mucosal injury (there were several small petechiae of the gastric mucosa, none of which were of full thickness or penetrated the mucosa) [6]
- Alkaline ingestion

Insertion of an NG tube

Assessment :

-Who needs nasogastric intubation

- Neuromuscular impairment
- Surgery patients
- Ventilated patients
- Patients who are unable to maintain adequate oral intake

Patient Medical History (patency of nares)

Ask about history of:

- ✓ Nosebleeds
- Nasal surgeries
- ✓ Deviated septum
- Anticoagulation Tx.

Don't forget to also assess

- Patient's mental status
- Patient's gag reflex
- Bowel sounds (consider a thorough physical examination

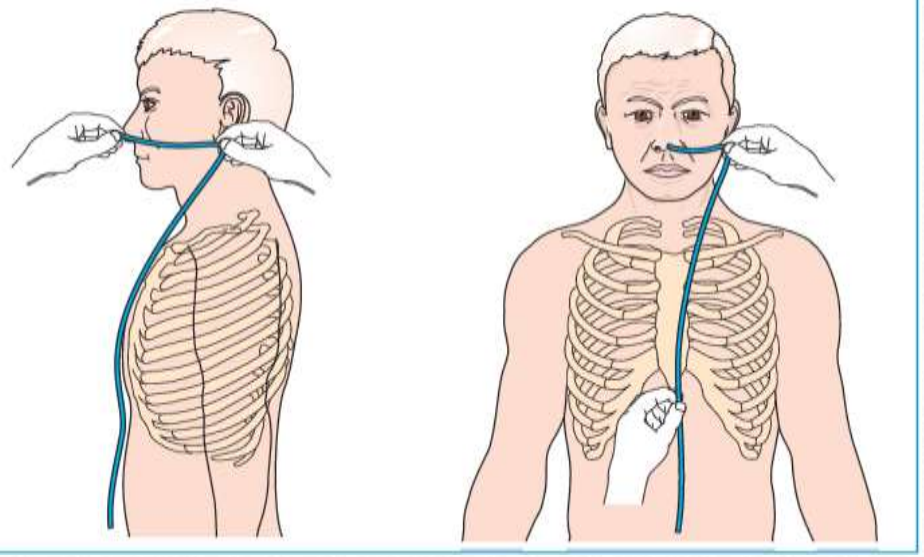
Preparations:

- ❑ NG tube (Adults size: 16-18Fn) (Pediatrics : [age+16]/2) , keep in mind
that the size differs depending on the type and usage of the tube.
- ❑ Lubricant and topical anesthetic (Benzocaine, Lidocaine).
- ❑ Flashlight.
- ❑ Emesis basin.
- ❑ 60 ML Catheter tipped syringe.
- ❑ Towel or Blue pad.
- ❑ Cup of water and straw.
- ❑ Stethoscope.

- ❑ Explain the procedure to the patient.
- ❑ Position the patient in a sitting or High-Folwer's position
- ❑ Check the tube for any flaws.
- ❑ Determine the length of the tube to be inserted (Measure the distance from the tip of the nose to the earlobe and to the xiphoid process of the sternum)
- ❑ Prepare the NG tube for insertion.

FIGURE 1

Estimating nasogastric tube length



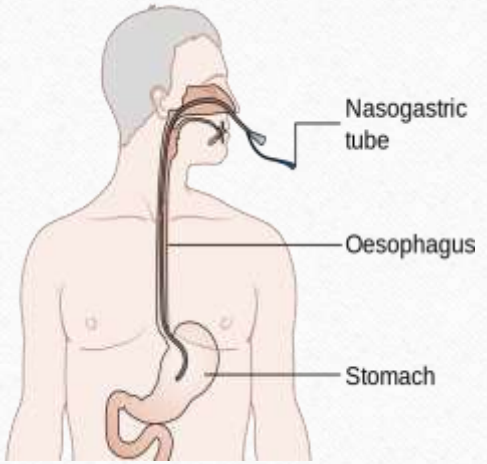
Implementation:

- ❑ Wash hands and put on sterile gloves
- ❑ Lubricate the tube
- ❑ Hand the patient a glass of water
- ❑ Gently insert the tube through the nostrils to the back of throat (posterior nasopharynx) . Aim back and down toward the ear.
- ❑ Ask the patient to flex their head toward the chest after the tube has passed through the nasopharynx.
- ❑ Emphasize the need to breathe from the mouth and swallowing during the procedure (swallowing makes it easier to pass the tube through the oropharynx)
- ❑ Advance the tube each time the patient swallows until the desired length has been

reached (don't force the tube in) , then check for the placement by either X-ray or aspiration (test for pH if < 4 then correct gastric placement).

Complications of nasogastric intubation:

- ➢ Abdominal cramping.
- ➢ Increase in abdominal girth(swelling).
- ➢ Diarrhea.
- ➢ Nausea & Vomiting.
- ➢ Nasopharyngeal trauma with or without hemorrhage
- ➢ Sinusitis and sore throat
- ➢ Pulmonary aspiration (If the tube lumen got blocked)
- ➢ Traumatic esophageal or gastric hemorrhage or perforation
- ➢ Intracranial or mediastinal penetration (very rare)



Evaluation:

- ❑ Observe the patient to determine the response to the procedure.
- ❑ Persistent gagging or coughing is alarming:

-Prolonged intubation and stimulation of the gag reflex can result in vomiting and aspiration

-Coughing may indicate presence of tube in the airway

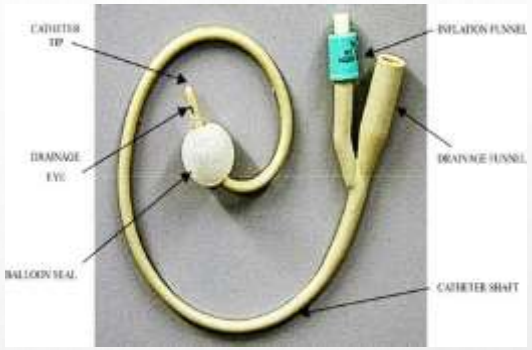
- ❑ Documentation:

-Size of tube , which nostril and patient response.

-Record length of tube from the nostril to the end of the tube

Responsibilites

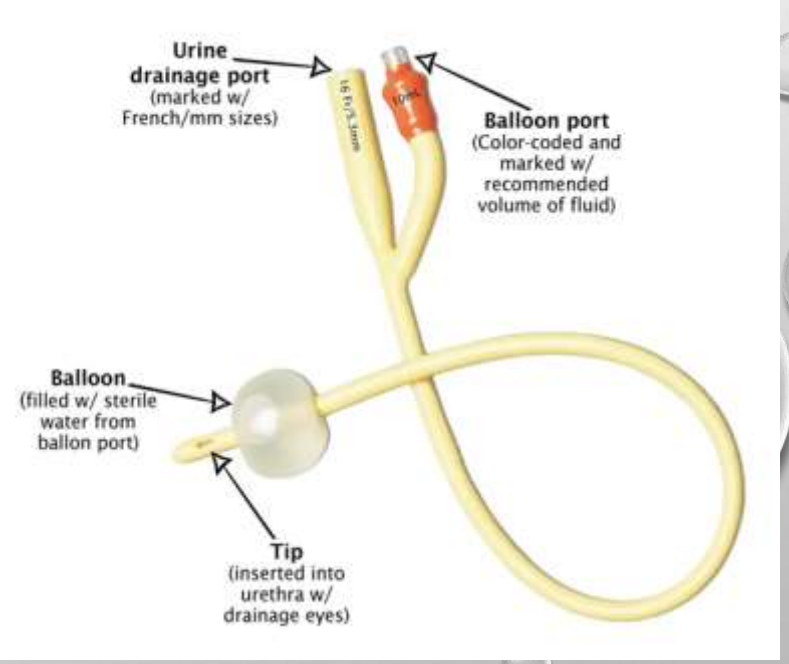
- Identify the signs and symptoms of inadvertent respiratory migration
- Identify conditions that increase the risk for spontaneous tube dislocation from the intended position (retching,vomiting,coughing



FOLEY'S CATHETER

MADE BY :

SABA BN TAREEF

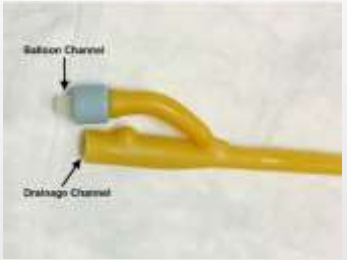


A Foley's catheter is a flexible tube that is passed through the urethra and into bladder.

The tube has two separated lumen. One lumen is open at both ends,and allows urine to drain out into a collection bag.
The other lumen has a valve on the outside end and connects to a balloon at
the tip . The balloon is inflated with sterile saline when it lies inside the bladder, in order to stop it from slipping out.
Foley’s catheters are commonly made from silicone rubber or natural rubber.

TYPES

- **Two-way Foley catheter:** This type of catheter has two
- channels, one for inflating the balloon and one for draining
- urine.



- **Three-way Foley catheter:** This type of catheter has three
- channels, one for inflating the balloon, one for draining urine,
- and one for irrigating the bladder.

- The relative size of an indwelling urinary catheter is described using French units (Fr).

- 1 Fr is equivalent to 0.33 mm
- The most common sizes are 10 Fr to 28 Fr.

- Foley catheters are usually color coded by size with a solid color band at the external end of the balloon inflation tube, allowing for easy identification of the size.

Color		French units	mm
	Yellow-green	6	2.0
	Blue	8	2.7
	Black	10	3.3
	White	12	4.0
	Green	14	4.7
	Orange	16	5.3
	Red	18	6.0
	Yellow	20	6.7
	Purple	22	7.3
	Blue	24	8.0
	Black	26	8.7

The procedure

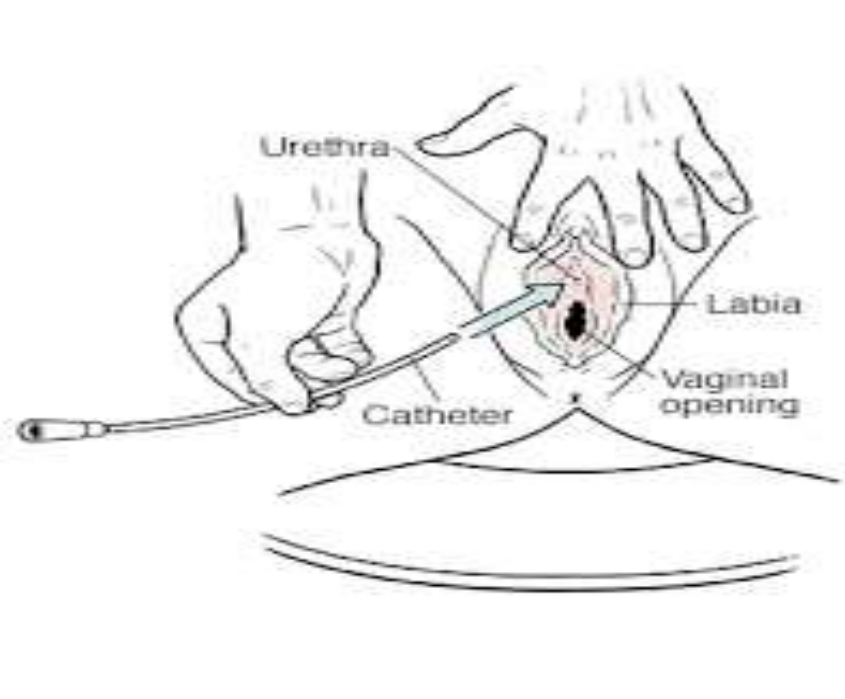
- Explain the steps and the reason for the procedure to the patient .
- Privacy
- Catheter equipment (urinary catheterization kit is sterile , contain the Foley catheter, drainage bag. lubricant ,10 cc syringe with sterile water , sterile gloves , iodine , sterile gauze and sterile drape

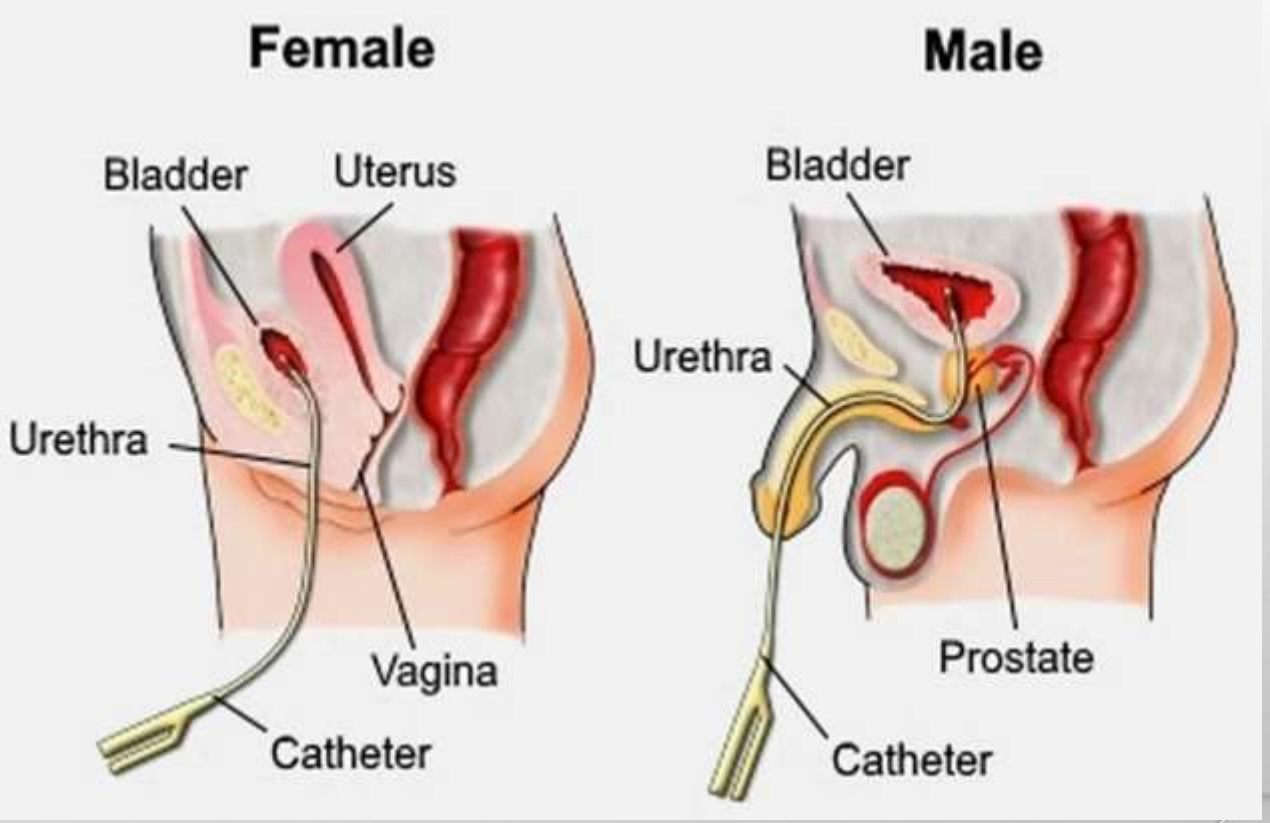
female catheterization

- the female urethra is short compared to male urethra , it is located above the vagina
- in the pelvis .
- insertion of the catheter is facilitated by having the patient lie down on her back with
- her buttocks at the edge of the bed .
- adequate exposure of the urethra is obtained by elevating the legs in lithotomy
- position
- finally the labia are separated to expose the urethra

male catheterization

- the male urethra is long compared to the female urethra .
- the catheter is placed while the patient is lying down
- if there is foreskin , it is retracted to its maximal level


Urethra
Labia
Vaginal opening
Catheter


Female
Male
Bladder
Uterus
Urethra
Vagina
Catheter
Bladder
Urethra
Prostate
Catheter

The doctor or medical assistant will insert the Foley's catheter in this manner:

- **the urethra and the surrounding areas are cleaned with a cotton ball dipped in antiseptic solution. Beginning at the urethra, the cleansing is performed in a circular motion, moving outward to the surrounding areas.**

- **a Foley catheter, lubricated with water soluble jelly, is inserted into the bladder through the urethra. .once the catheter is passed, the balloon is in the bladder. It is then slowly inflated with about 10cc of water using a syringe. Inflating the balloon should not be painful. .at this time, urine if present in the bladder should flow back through the catheter and into the sterile drainage bag**

When Foley's catheters are used

- Indwelling urinary catheters are most commonly used to assist people who cannot urinate on their own. Indications for using a catheter include providing relief when there is urinary retention, monitoring urine output for critically ill persons, managing urination during surgery, and providing end-of-life care.

- On patients with acute urinary retention with or without bladder outlet obstruction
  - Enlarged prostate (BPH) , blood clot
  - Kidney stone , bladder stone
  - tumor

- On patients with kidney disease and critically ill patiants whose urine output must be constantly and accurately measured hourly.

- immobilized patients :
  - pressure ulcers
  - spinal cord injury
  - surgery (patients who are anesthetized)
  - pelvic fracture

- On some urine incontinent patients

- A major problem with Foley's catheter is that they have a tendency to contribute to **urinary tract infections(UTI)** . This occurs because bacteria can travel up from catheter to bladder where the urine can become infected.

- Approximately, **80%** of health care-associated UTIs are related to the use of indwelling urinary catheters.

- If the balloon is opened before the Foley's catheter is completely inserted in to the bladder …**bleeding** ; **damage** and **even rupture** of the urethra can occur.

- In some individuals, long-term permanent **scarring** and **strictures** of the urethra could occur

navilas

Urinary Catheter: Contraindications

- Traumatic injury
- Suspicion of urethral laceration
- Acute bacterial prostatitis
- Refusal by patient to be catheterised
- Failed attempt at catheterisation

Drainage bag

✓ removal of the catheter and bag >>>The catheter balloon is deflated by inserting a syringe into the catheter valve and pulling back on the syringe. the pressure in the balloon will cause the water to flow into the syringe. once the balloon is empty the Foley catheter can be pulled out.

✓ In some individuals, long-term permanent scarring and strictures of the urethra could occur .

THANK YOU