

# Intraosseous Infusion Workshop

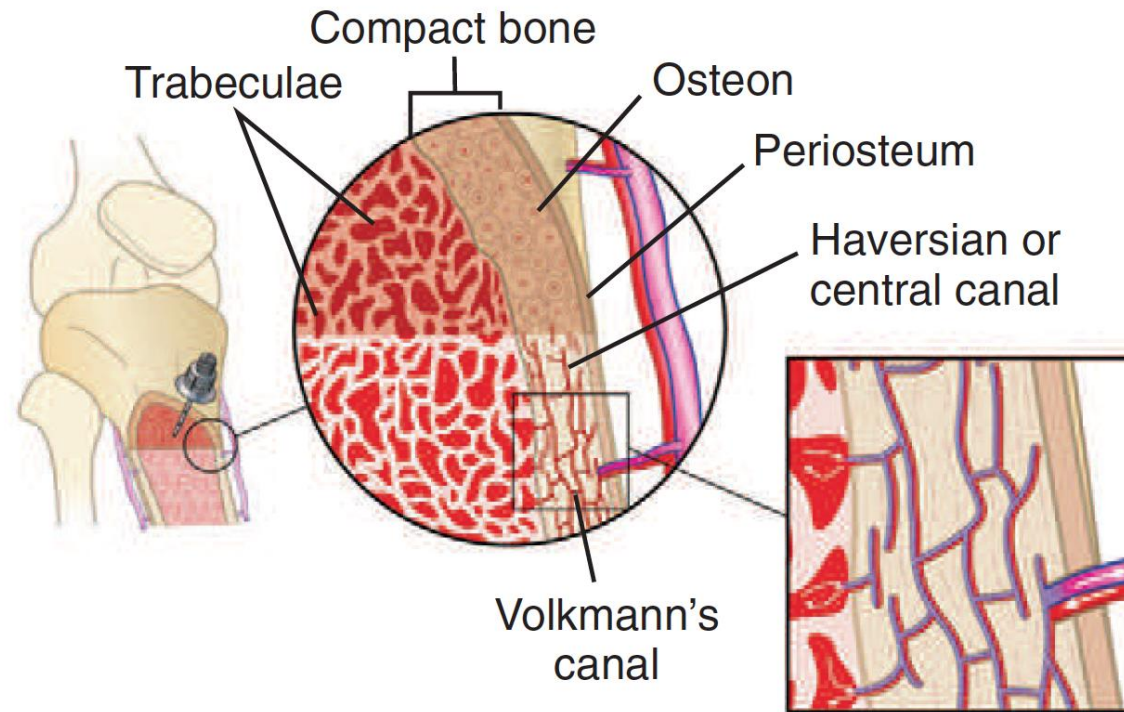
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# 10



**Figure 25-1** Schematic diagram illustrating the vascular anatomy of a long bone with an intraosseous needle in place.

# EZ-10 Device



# Bone Injection Gun



# Various intraosseous needles



Jamshidi Bone Marrow  
Aspiration Needle



Illinois Sternal/Iliac  
Aspiration Needle



Jamshidi Disposable  
Sternal/Iliac Aspiration Needle



Cook IO Needle



Sur-Fast Needle

# IO INDICATION

- 1- Emergency intravascular access when other methods have failed
- 
- 2- Cardiac arrest in infant and young children
- 3- Military applications

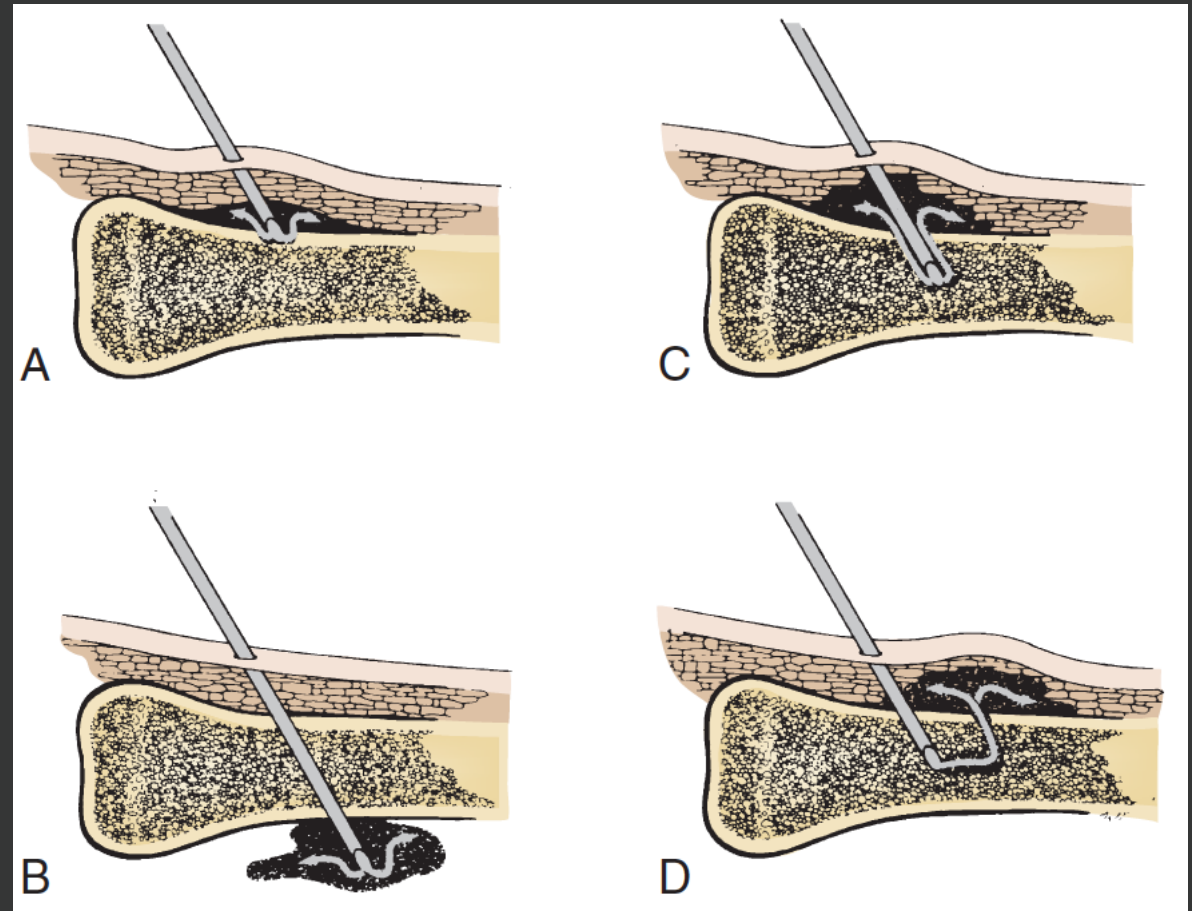
# IO CONTRAINDICATIONS

- 1- Osteoporosis and osteogenesis
- 2- Fractured bone
- 3- Prior use of same bone for io infusion
- 4- Cellulitis or burn overlaying insertion site

# IO Complications

- A- TECHNICAL DIFFICULTIES

- 1- Over penetration
- 2- Incomplete penetration
- 3- Needle obstruction
- 4- Fluid extravasation





# IO Complications

- B- SOFT TISSUE AND BONY COMPLICATIONS

- 1- Infection

- 2- Bony inflammatory

- 3- Skin sloughing

- 4- Compartment syndrome

- 5- Epiphyseal injury

- 6- Fat embolism

- 7- Pain with infusion

# MEDICATIONS AND FLUIDS BY IO

## **BOX 25-1** Medications and Fluids That Can Be Administered Intraosseously

### **MEDICATIONS**

Adenosine  
Antibiotics  
Antitoxins  
Anesthetic agents  
Atracurium besylate  
Atropine  
Calcium chloride  
Calcium gluconate  
Contrast media  
Dexamethasone  
Diazepam  
Diazoxide  
Digoxin  
Dobutamine  
Dopamine  
Ephedrine  
Epinephrine  
Heparin  
Insulin  
Levarterenol  
Lidocaine  
Lorazepam

Mannitol  
Morphine  
Naloxone  
Pancuronium  
Phenobarbital  
Phenytoin  
Propranolol  
Sodium bicarbonate  
Succinylcholine  
Thiopental  
Vecuronium

### **FLUIDS**

#### **Crystalloids**

Dextrose solutions  
Sodium chloride solutions  
Lactated Ringer's solution

#### **Colloids**

Blood and blood products  
Packed red blood cells  
Plasma

# LABORATORY TESTING

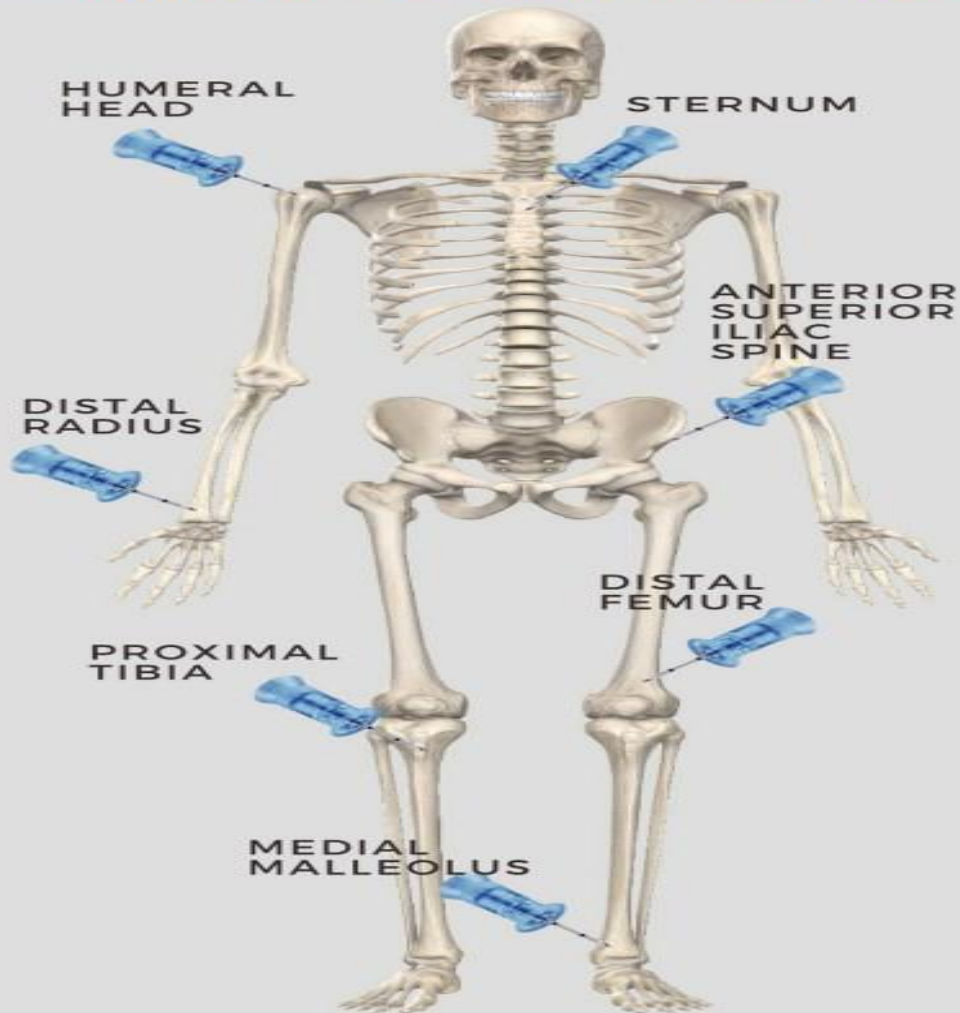
**TABLE 114-2** IO Laboratory Findings Compared With Phlebotomy

	<b>Equivalent</b>	<b>Use Caution in Interpretation</b>
Hematologic	Hemoglobin	Leukocytes, hematocrit, platelets
Chemistries	Sodium, chloride, glucose, bilirubin, bicarbonate, urea, and creatinine	Potassium, aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase
Venous gas	pH	P <sub>CO<sub>2</sub></sub> , P <sub>O<sub>2</sub></sub>
Transfusion	ABO, Rh typing, and leukocyte activity	—

*Abbreviations:* P<sub>CO<sub>2</sub></sub> = partial pressure of carbon dioxide; P<sub>O<sub>2</sub></sub> = partial pressure of oxygen.



## INTRASOSSEOUS LINES AND ACCESS SITES



-  YELLOW - (45 MM) FOR LARGE PATIENTS OR DENSE BONE SITES
-  BLUE - (25 MM) FOR PATIENTS 40 KG AND GREATER
-  PINK - (15 MM) FOR PATIENTS 3 – 39 KG

# IO HOW ?

- [https://youtu.be/DB\\_Jly2jEDY](https://youtu.be/DB_Jly2jEDY)
  
- <https://youtu.be/KHXSfh2ZRDM>

# Tube Thoracostomy Workshop

Dr Tariq Al thobaiti ,MBBS

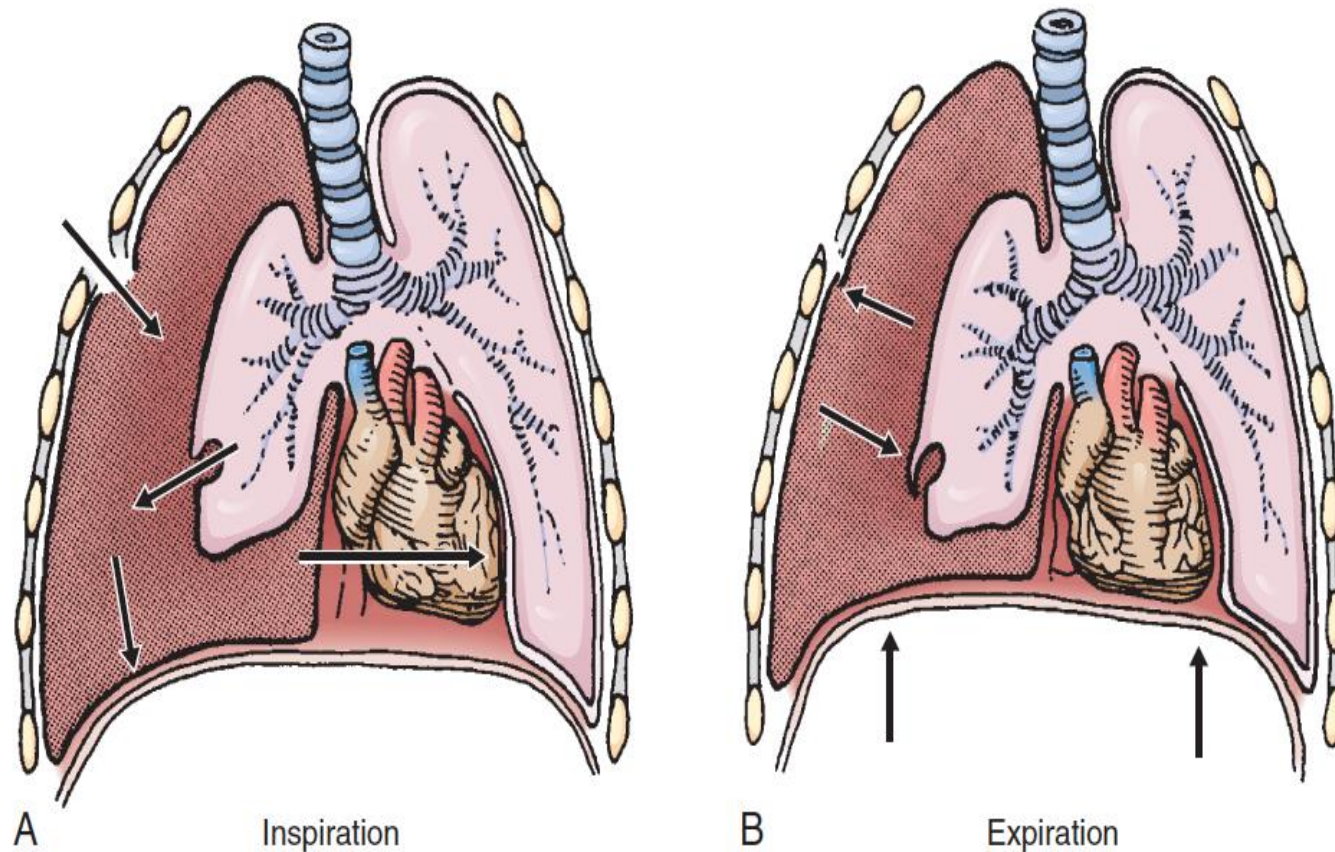
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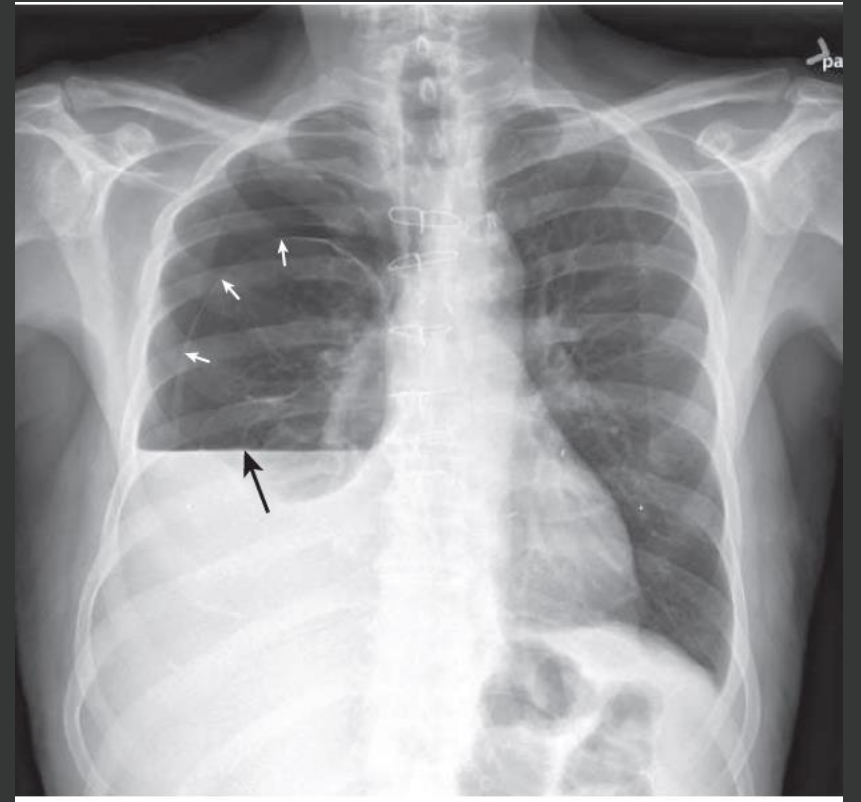
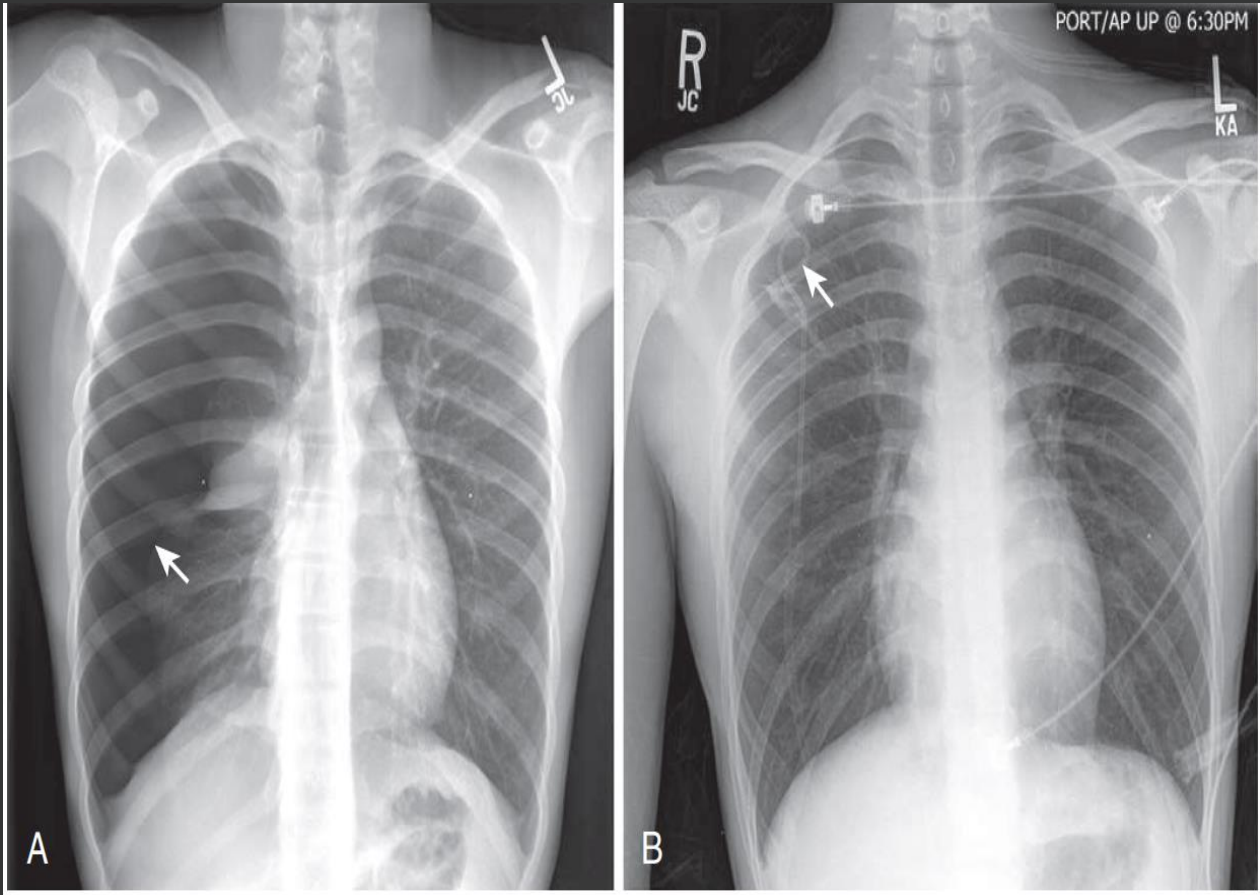
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# How?

RESPIRATORY PROCEDURES



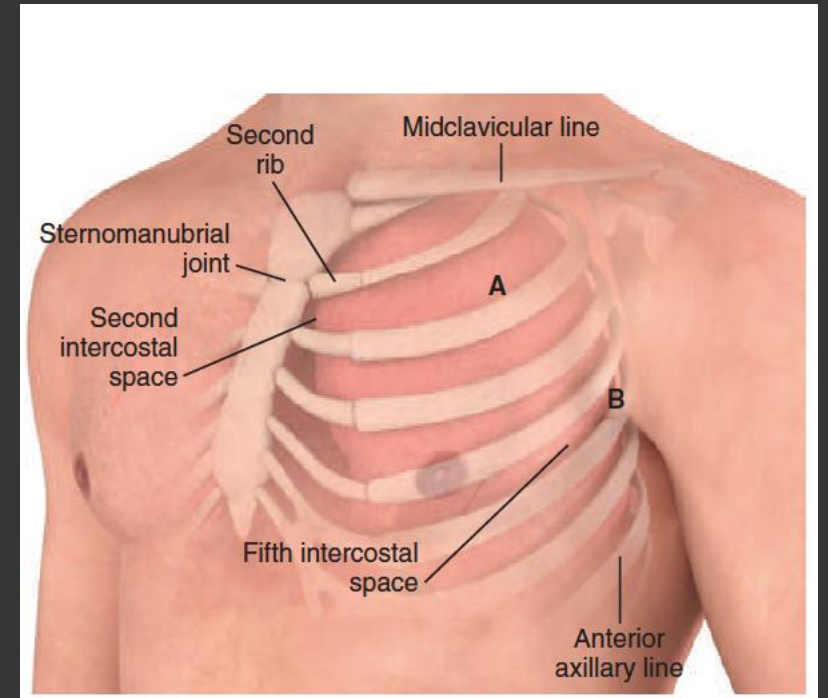
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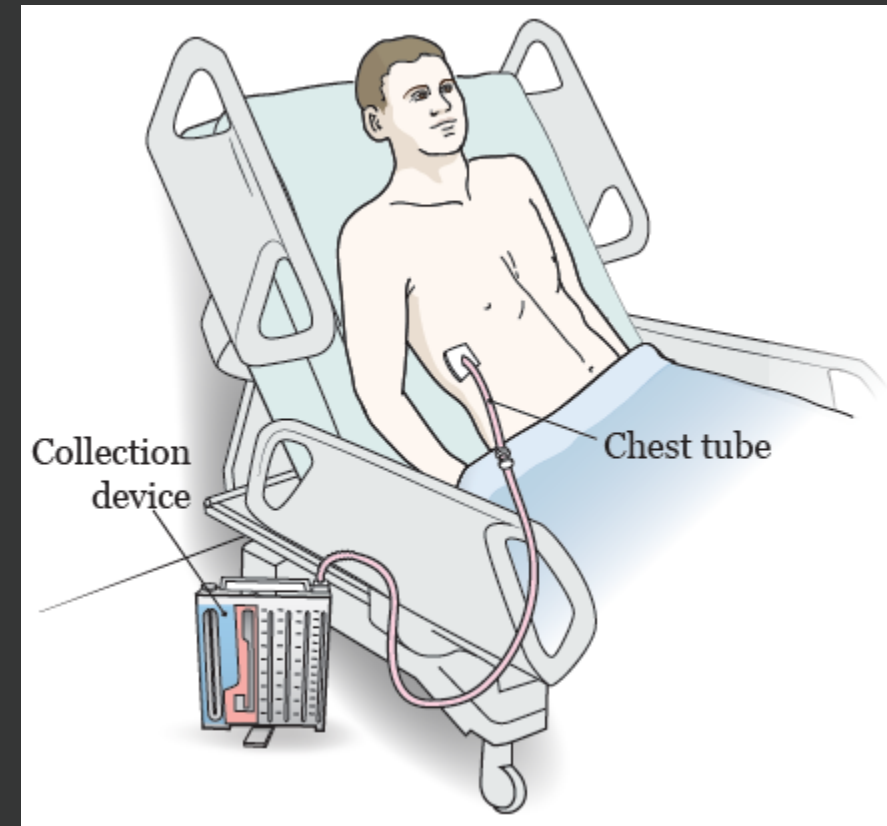
# indication

- 1- Spontaneous and traumatic pneumothorax
- 2- Hemothorax
- 3- Empyema
- 4- Patients with penetrating chest trauma undergoing positive pressure ventilation or long- distance transport



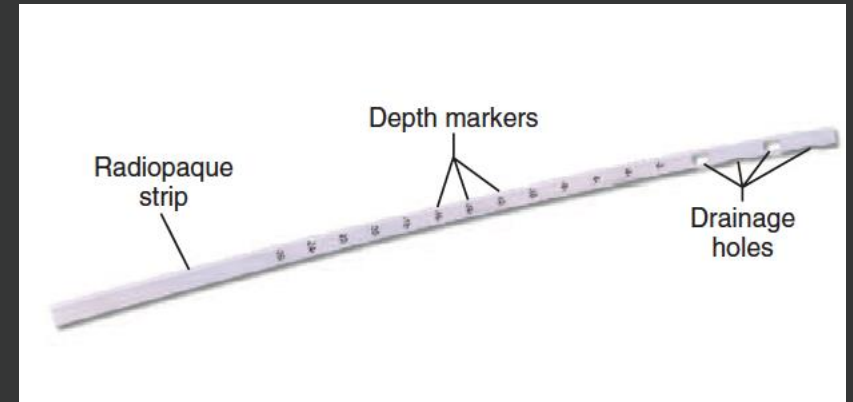
# Contraindication

- A- absolute  
none
- B- RELATIVE
  - 1- Presence of multiple pleural adhesions
  - 2- Presence of emphysematous blebs
  - 3- Coagulopathy

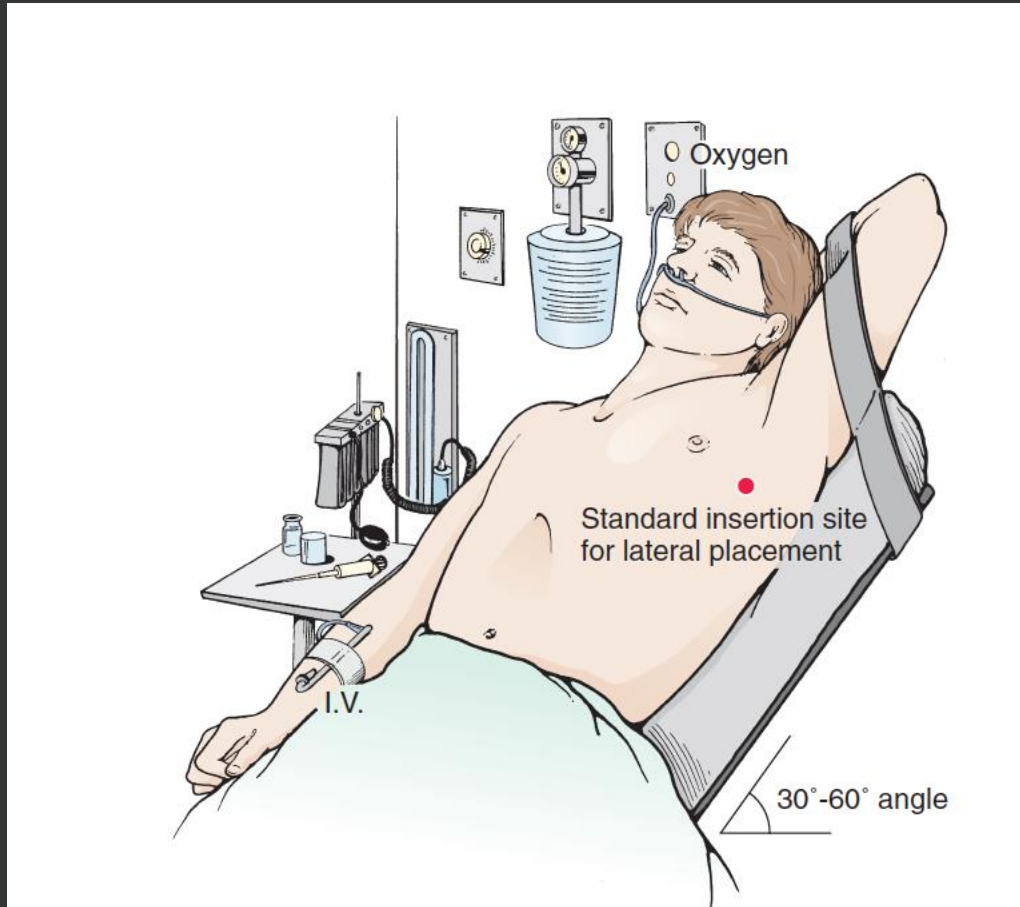


# Complications

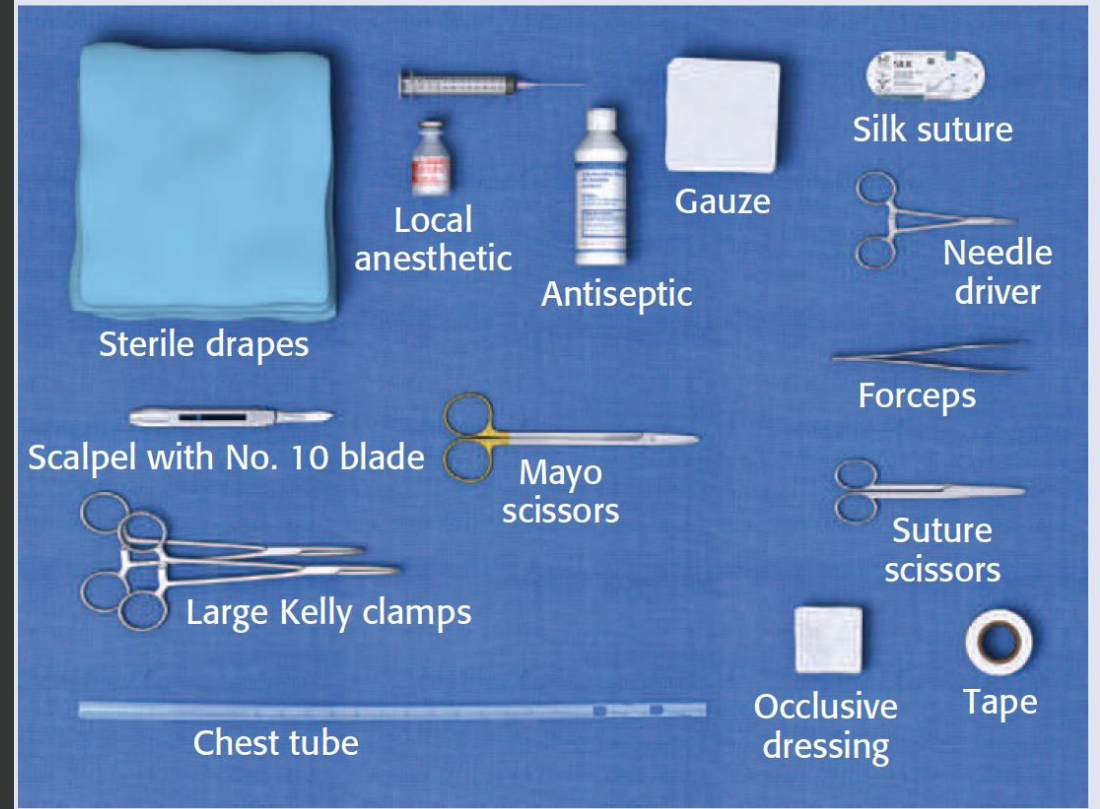
- 1- Infection
- 2- laceration of an intercostal vessel
- 3- Pulmonary injury
- 4- Intraabdominal or solid organ tube placement
- 5- Failure of reexpansion of pneumothorax
- 6- Reexpansion pulmonary edema



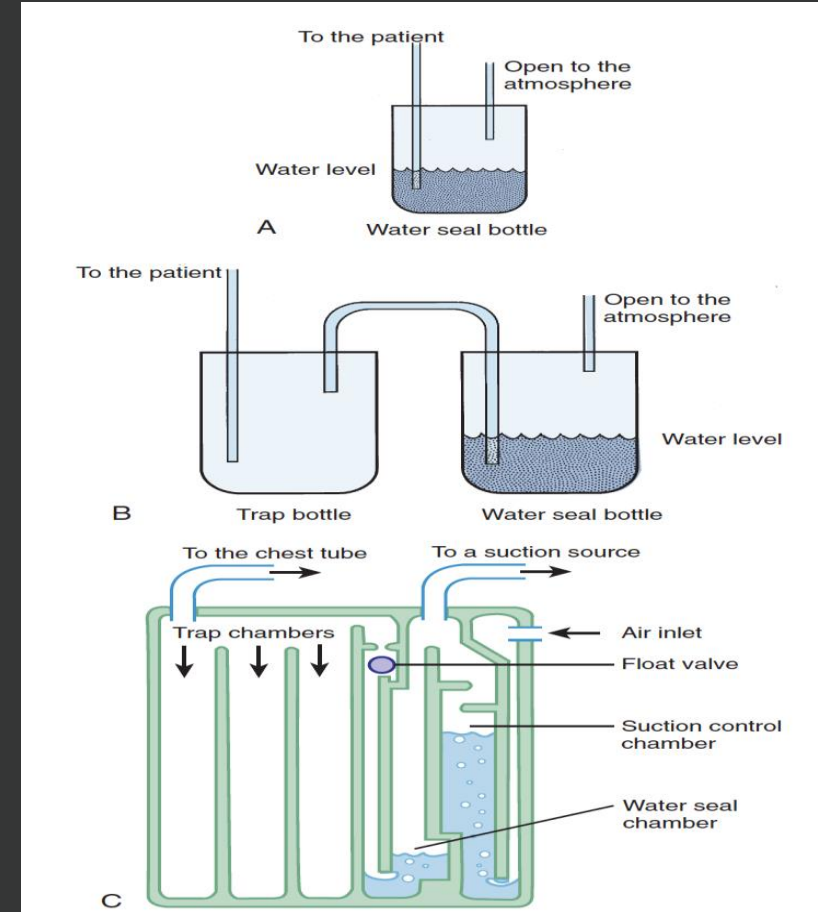
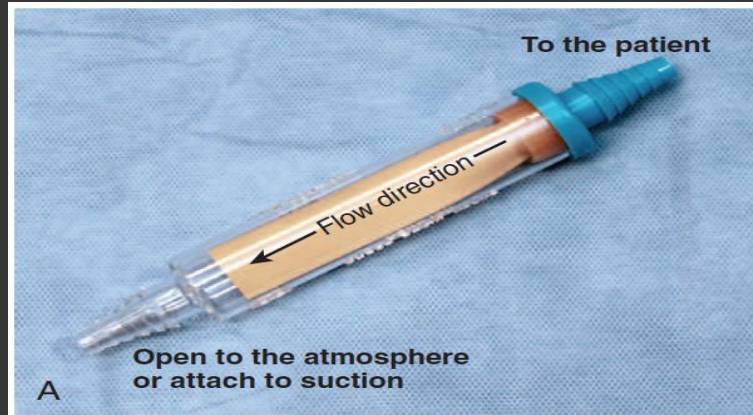
# What You Need?



## Equipment



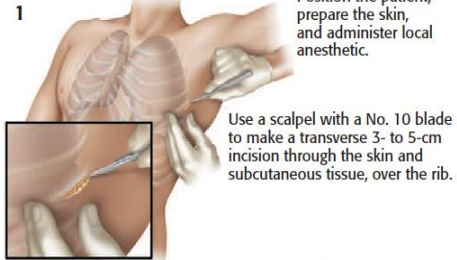
# Drainage and Suction Systems



# OTHER TECHNIQUES

## TUBE THORACOSTOMY

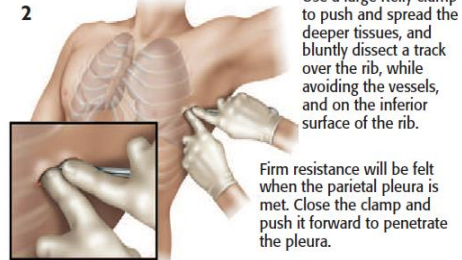
**1**



Position the patient, prepare the skin, and administer local anesthetic.

Use a scalpel with a No. 10 blade to make a transverse 3- to 5-cm incision through the skin and subcutaneous tissue, over the rib.

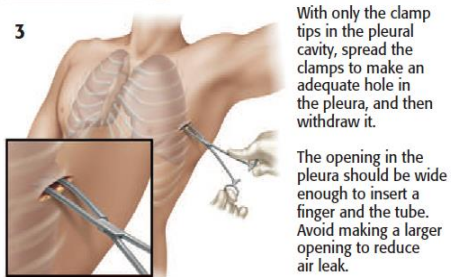
**2**



Use a large Kelly clamp to push and spread the deeper tissues, and bluntly dissect a track over the rib, while avoiding the vessels, and on the inferior surface of the rib.

Firm resistance will be felt when the parietal pleura is met. Close the clamp and push it forward to penetrate the pleura.

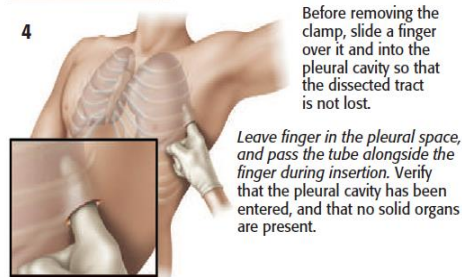
**3**



With only the clamp tips in the pleural cavity, spread the clamps to make an adequate hole in the pleura, and then withdraw it.

The opening in the pleura should be wide enough to insert a finger and the tube. Avoid making a larger opening to reduce air leak.

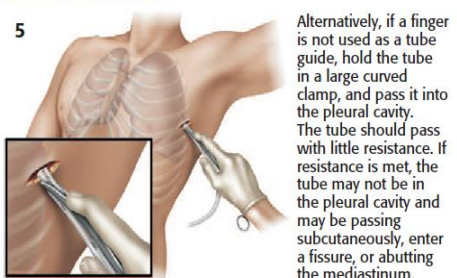
**4**



Before removing the clamp, slide a finger over it and into the pleural cavity so that the dissected tract is not lost.

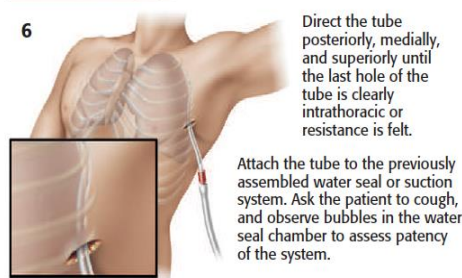
Leave finger in the pleural space, and pass the tube alongside the finger during insertion. Verify that the pleural cavity has been entered, and that no solid organs are present.

**5**



Alternatively, if a finger is not used as a tube guide, hold the tube in a large curved clamp, and pass it into the pleural cavity. The tube should pass with little resistance. If resistance is met, the tube may not be in the pleural cavity and may be passing subcutaneously, enter a fissure, or abutting the mediastinum.

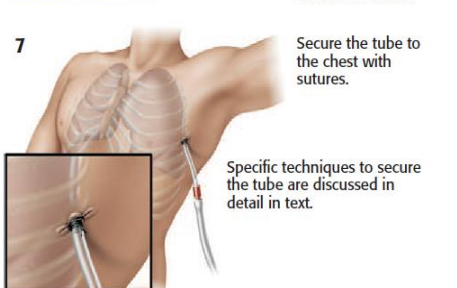
**6**



Direct the tube posteriorly, medially, and superiorly until the last hole of the tube is clearly intrathoracic or resistance is felt.

Attach the tube to the previously assembled water seal or suction system. Ask the patient to cough, and observe bubbles in the water seal chamber to assess patency of the system.

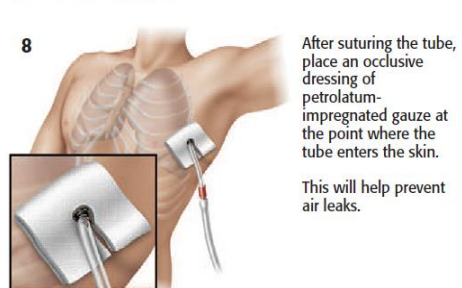
**7**



Secure the tube to the chest with sutures.

Specific techniques to secure the tube are discussed in detail in text.

**8**



After suturing the tube, place an occlusive dressing of petrolatum-impregnated gauze at the point where the tube enters the skin.

This will help prevent air leaks.

## CATHETER ASPIRATION OF PNEUMOTHORAX: SELDINGER TECHNIQUE



The Seldinger-type catheter kit contains a pigtail catheter and all necessary equipment, including local anesthesia, introducing needle and syringe, scalpel, guidewire, and dilator.



After generous local anesthesia, advance the introducing needle in a straight line over the top of the fifth rib until air is aspirated. Unless a straight tract is created, it will be difficult to advance the floppy catheter, and a tunneling approach cannot be used.



Advance the guidewire through the introducing needle into the pleural space, and then remove the needle. The procedural steps are analogous to initiating a central venous catheter via the Seldinger technique.



Puncture the skin at the site of wire insertion with a scalpel. Make the incision large enough to accept the dilator and pigtail catheter.



Advance the dilator over the wire to create a tract for the catheter. Remove the dilator while leaving the wire in place. Again, this is analogous to establishing a central venous line.



Advance the pigtail catheter over the wire through the dilated tract. It will assume its pigtail configuration when it is in the pleural space. A twisting motion may be needed to advance the catheter through subcutaneous tissue. Advance the catheter to the hilt and secure to suction. This catheter may be removed after a period of observation, or the suction may be maintained for a few days.

# HOW?

- <https://youtu.be/qR3VcueqBgc>

QUESTION ?