Chest Drains
(Under Water Sealed Drains)

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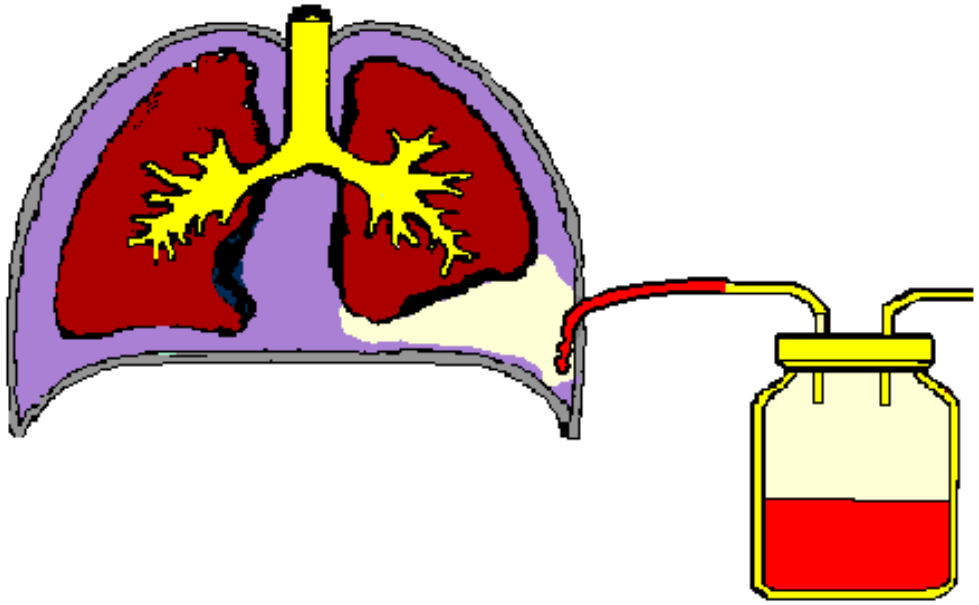


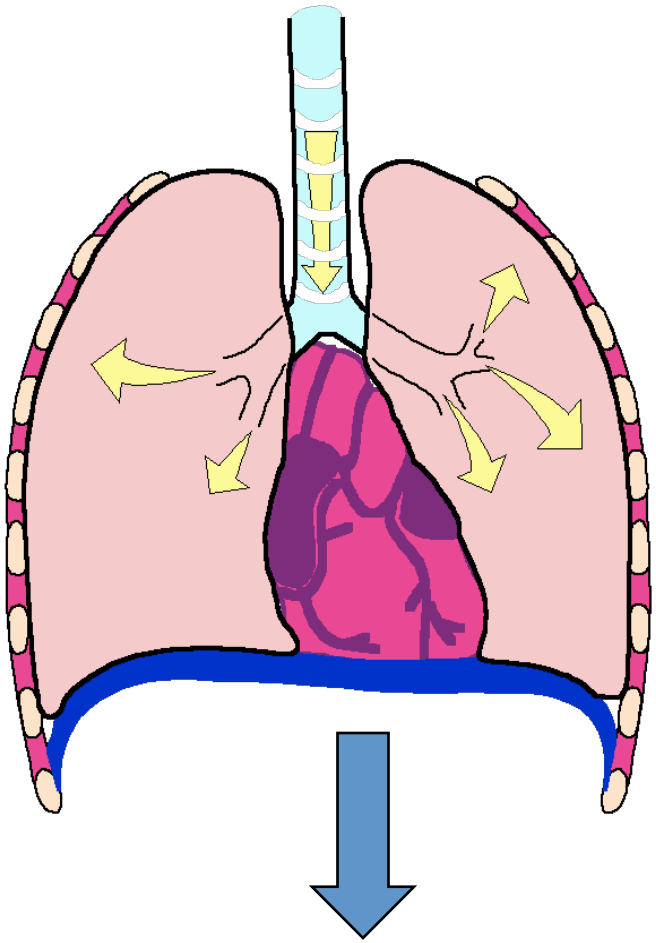
Introduction

Chest drains also known as under water sealed drains (UWSD) are used for:

- draining
- restoration of negative pressure in the thoracic cavity.

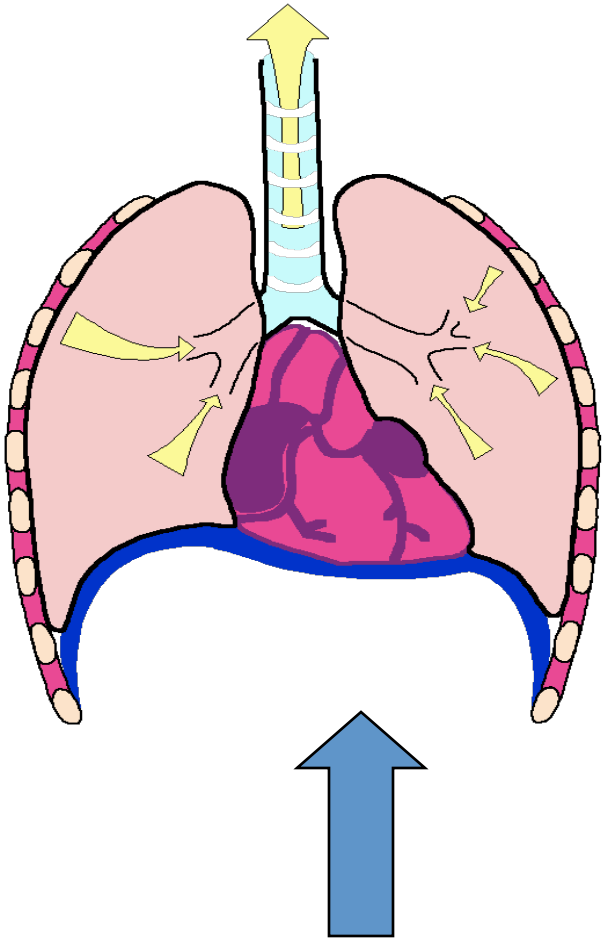
Why underwater seal?

Physiology: inspiration



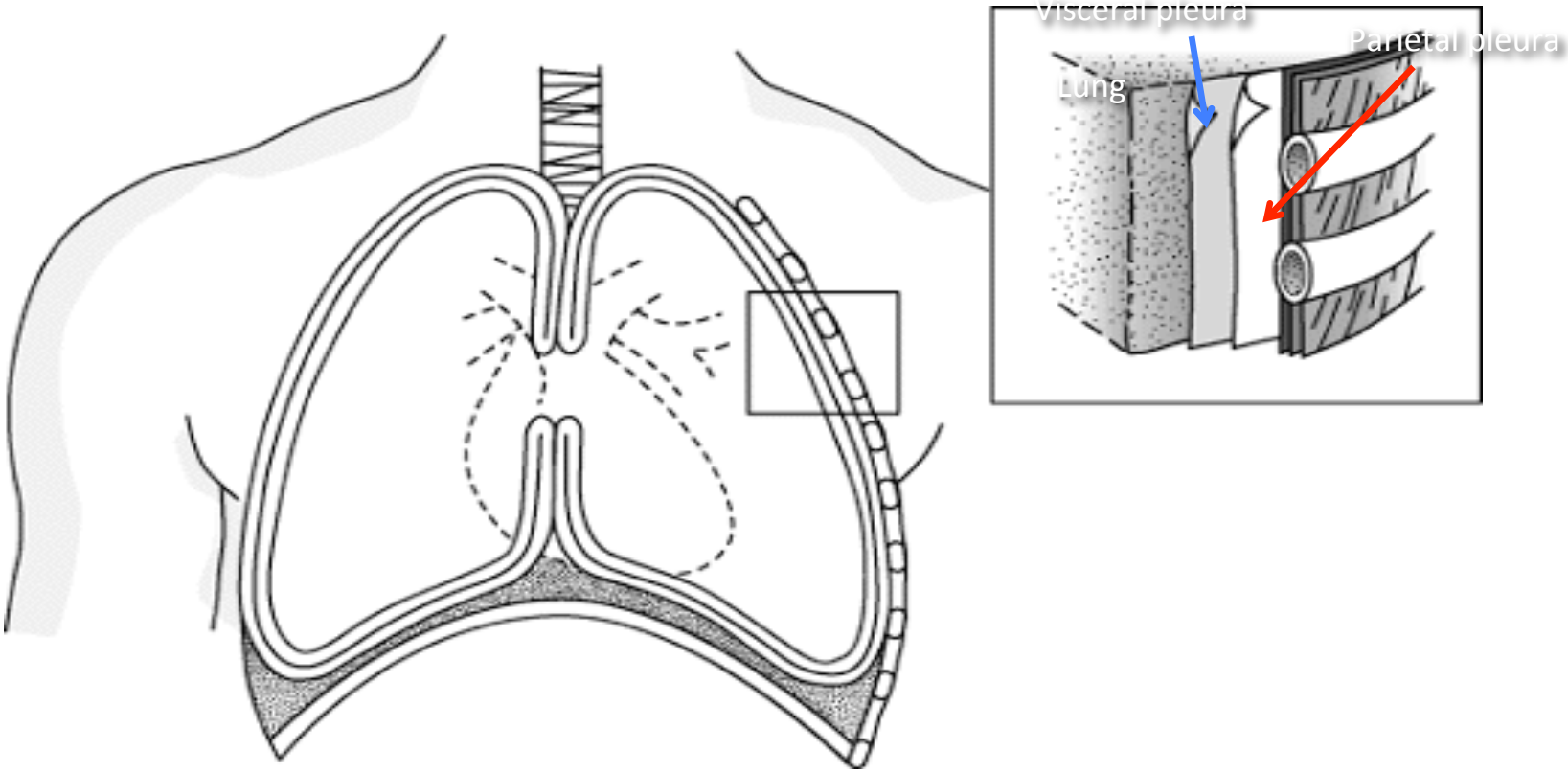
- Diaphragm
- Pressure equalization
- intrapulmonary pressure

Breathing: exhalation



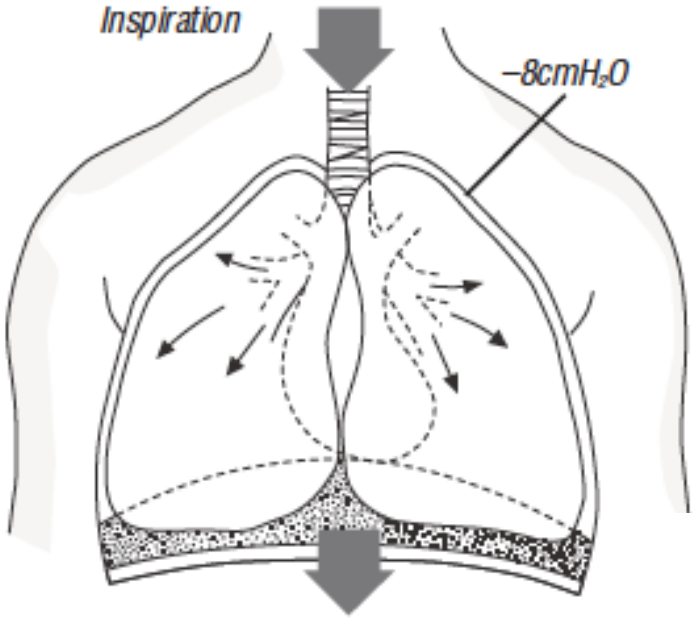
- phrenic nerve
- The diaphragm relaxes
- Volume reduction
- Increased intrapulmonary pressure
- Air flows out

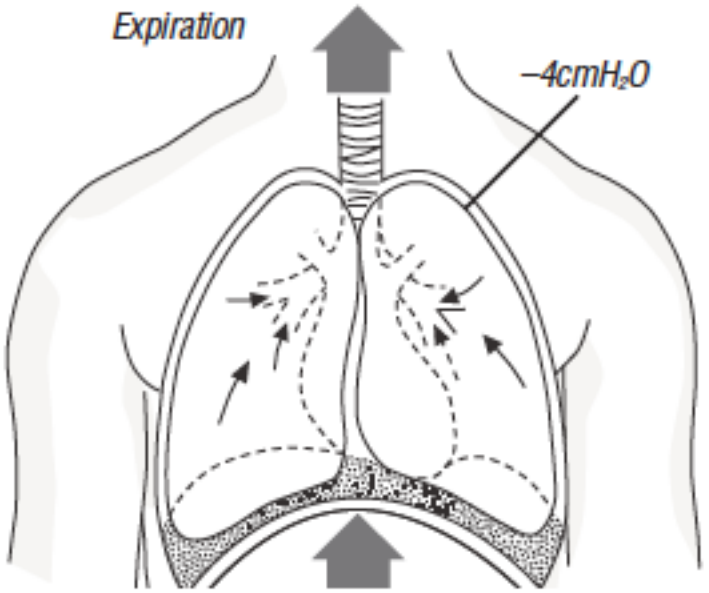
Pleural anatomy

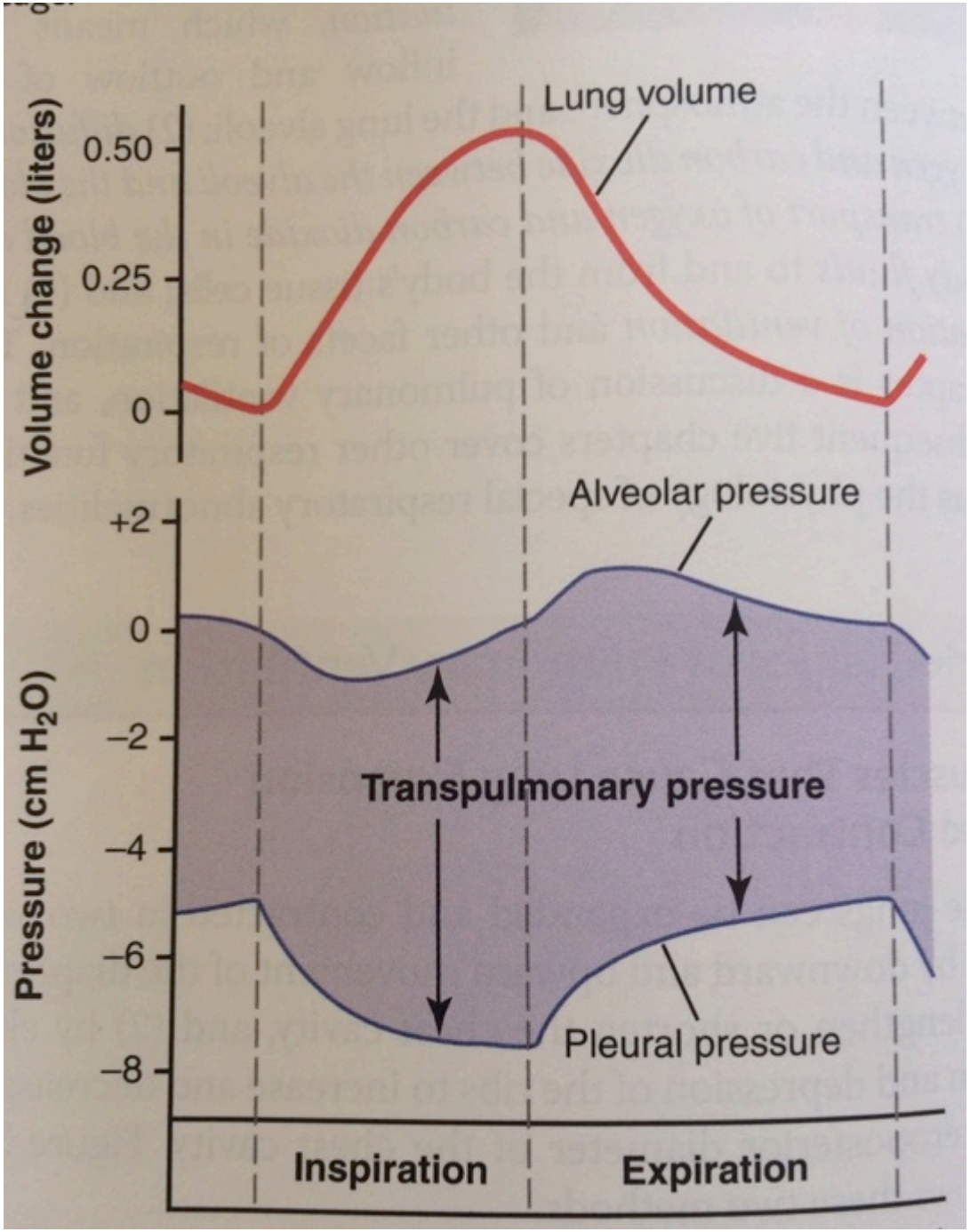


Normal Pleural Fluid Quantity:
Approx. 25mL per lung

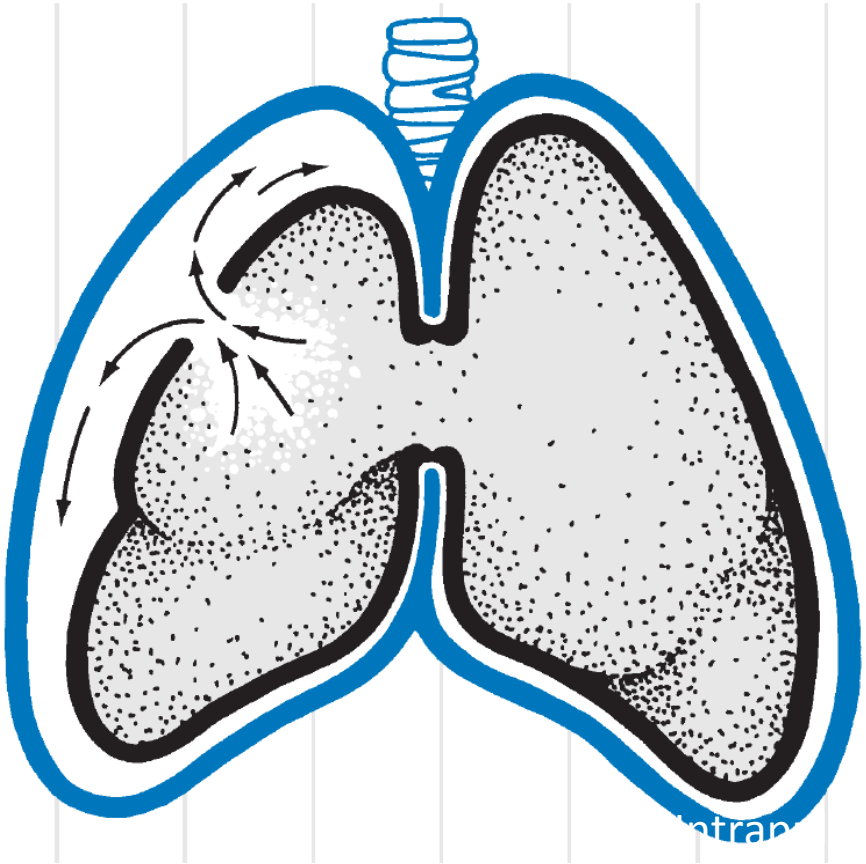
Pleural physiology





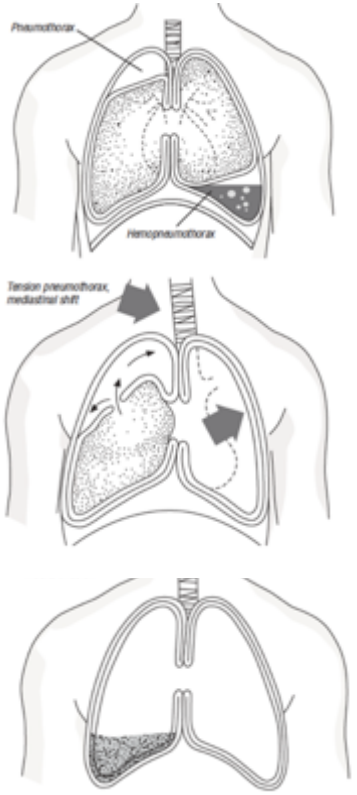

Lung volume
Volume change (liters)
0.50
0.25
0
Alveolar pressure
+2
0
−2
−4
−6
−8
Pressure (cm H_2O)
Transpulmonary pressure
Pleural pressure
Inspiration
Expiration

When pressures are disrupted



Indications for Insertion of a Chest Drain

- Post operatively
- Pneumothorax
- Haemothorax
- Empyema
- Chylothorax
- Pleural effusions



Contraindications for Insertion of a Chest Drain

Absolute:

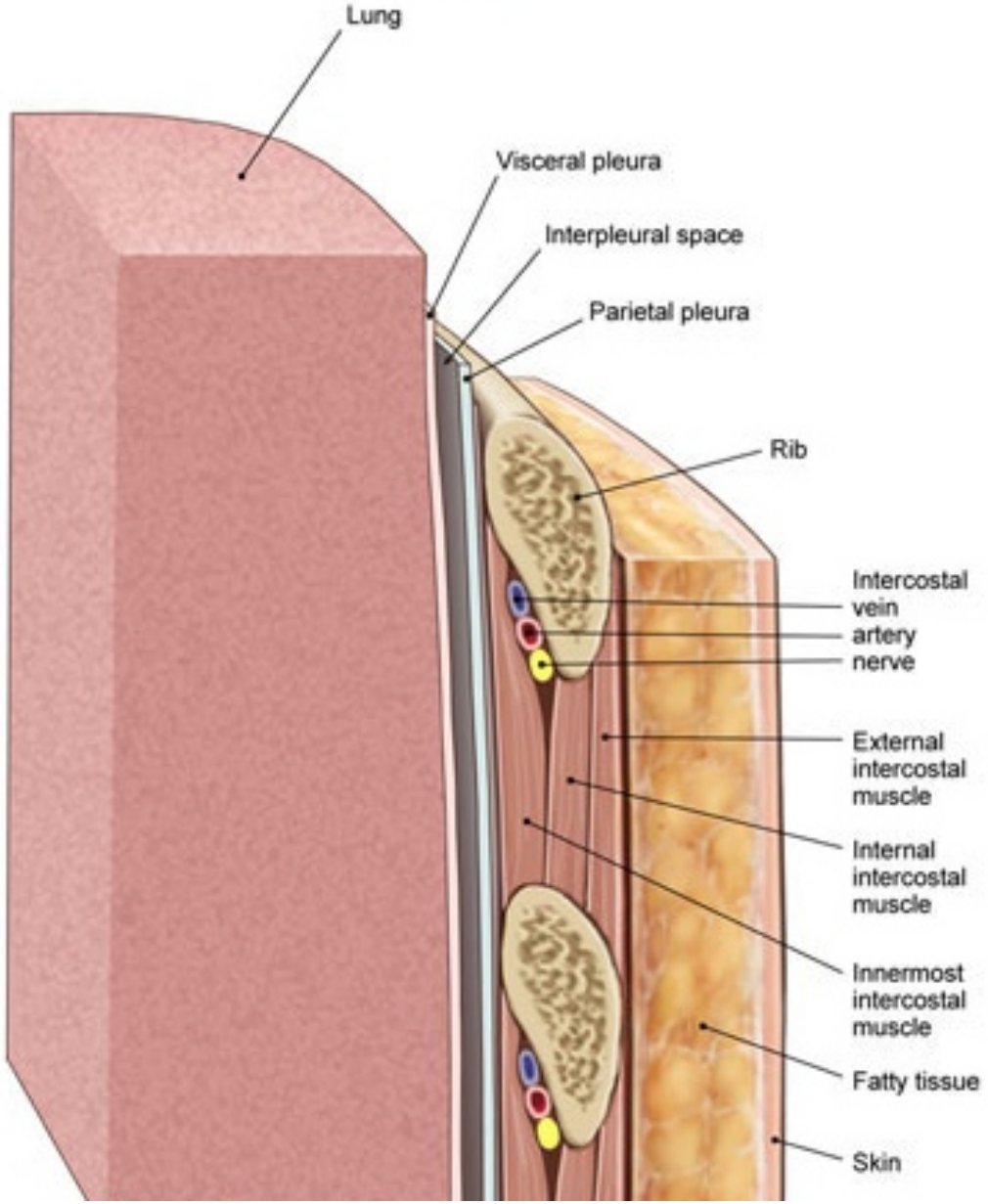
- When its not indicated
- Need for immediate thoracotomy

Relative:

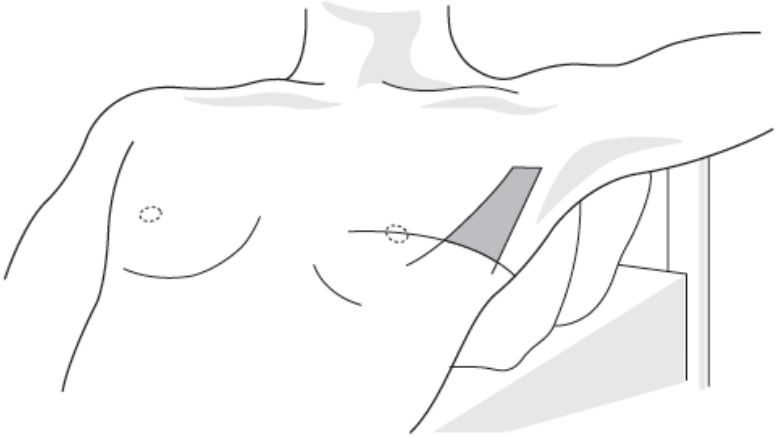
- Coagulopathy
- Platelet Defect

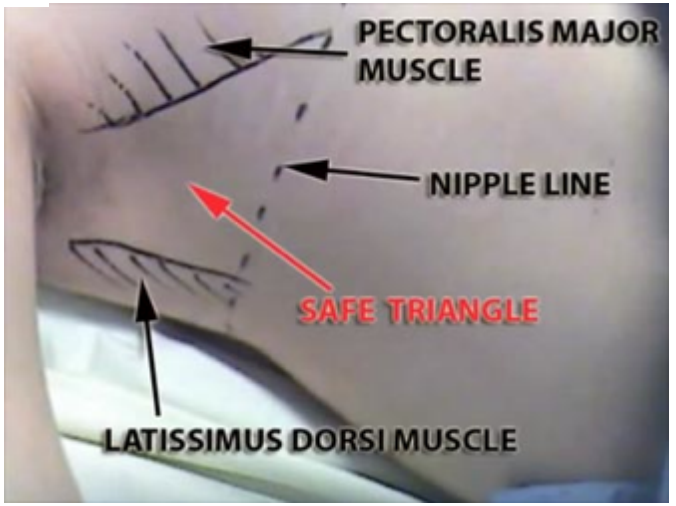
Principles of inserting a Chest Drain

Chest Wall Anatomy

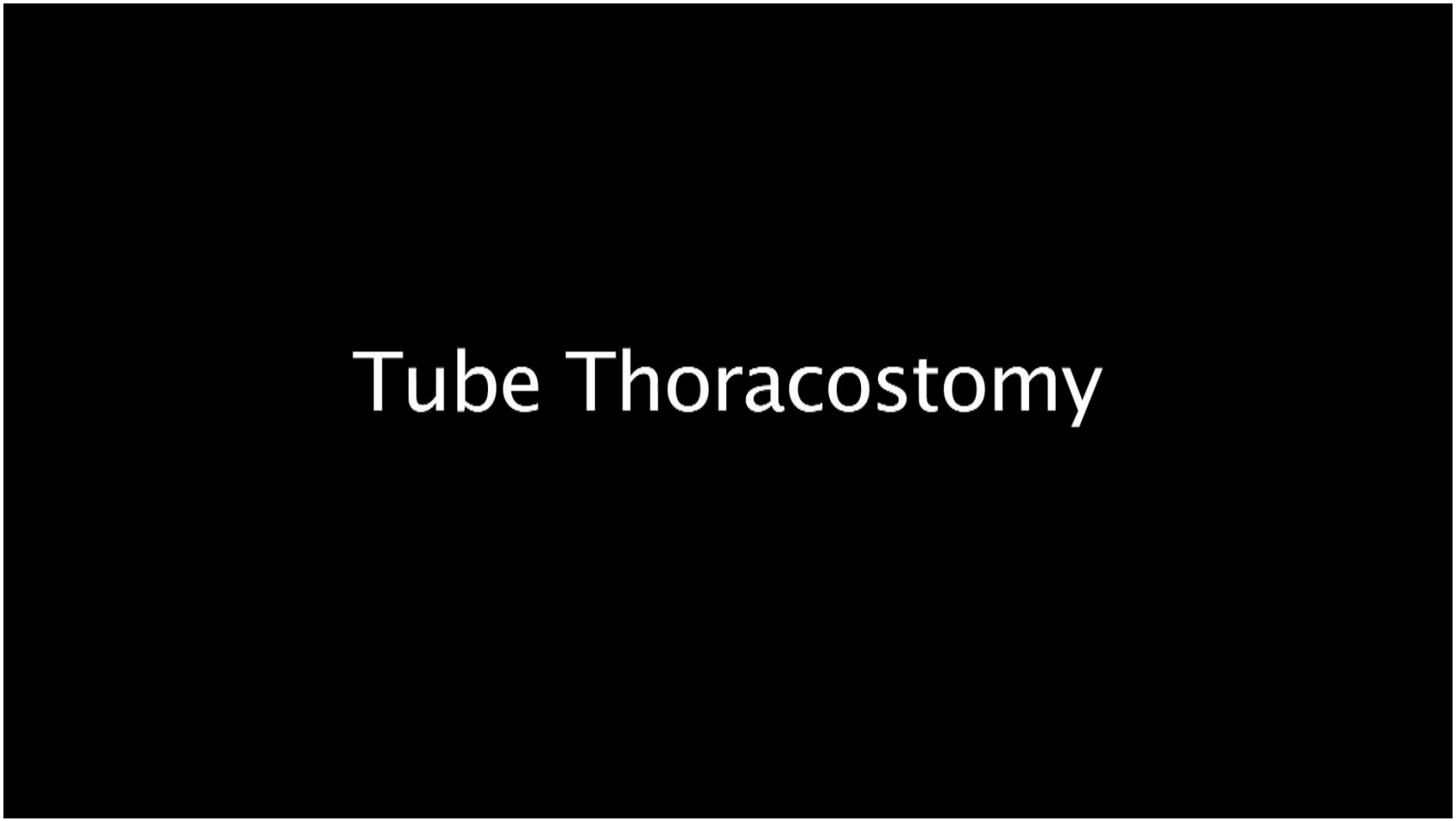


Safe Triangle





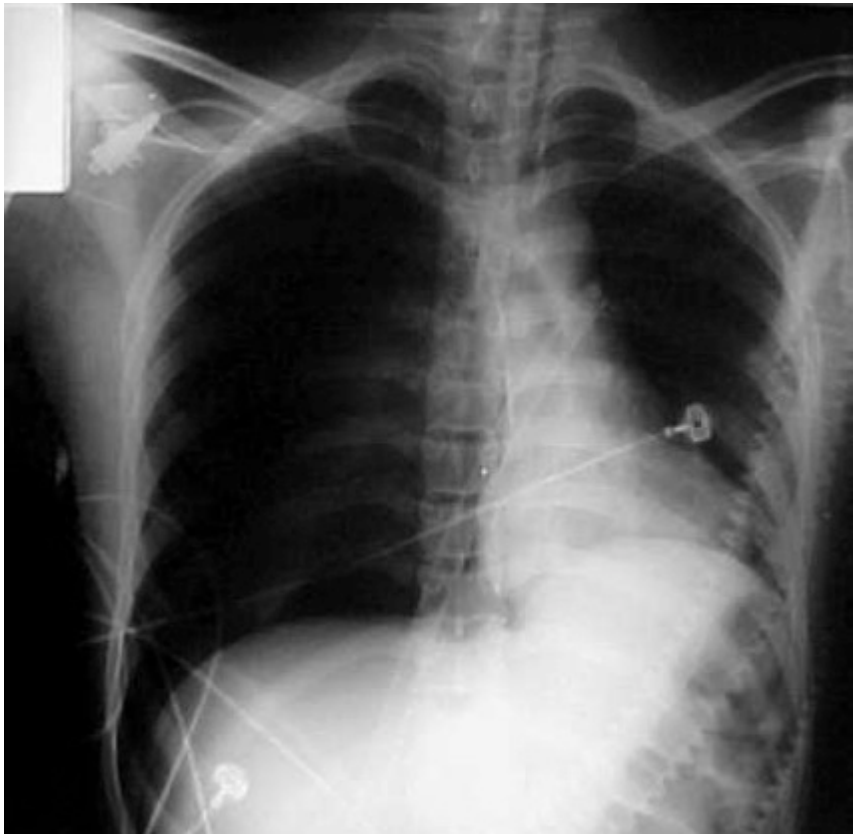
How to do a Tube Thoracostomy

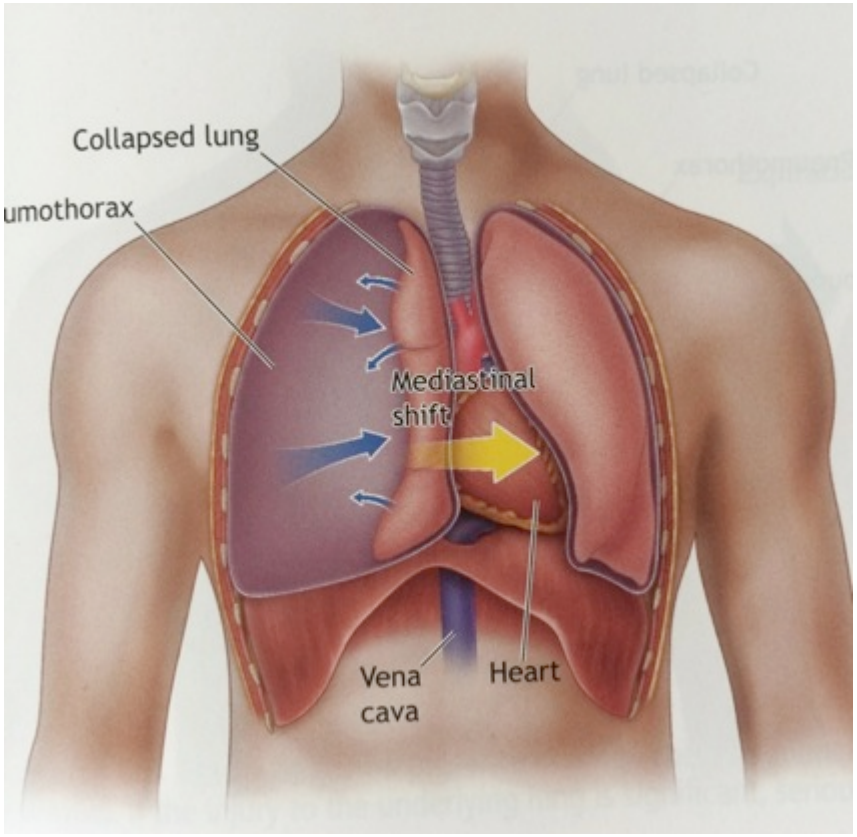


Steps of putting a chest drain

Post insertion

- Connect to UWSD
- Confirm functionality
- Repeat CXR
- Document the procedure




Collapsed lung
umothorax
Mediastinal shift
Vena cava
Heart

Needle Thoracostomy

How to do a Needle Thoracostomy

- There are a lot of reasons why the needle could fail to relieve a tension pneumothorax (or to only temporarily relieve a tension pneumothorax):

- Needle may be too short to enter the thorax

- Catheter could kink, allowing reaccumulation of air in the thorax.

Finger Thoracostomy

The use of a “simple thoracostomy” or “finger thoracostomy” was initially described in the literature in 1995.

- Method similar to Tube Thoracostomy without putting a drain
- Probably the best method in a crushing patient.
- Easier to teach and perform
- No foreign body, less complications
- No published studies to compare to other methods

Open pneumothorax:

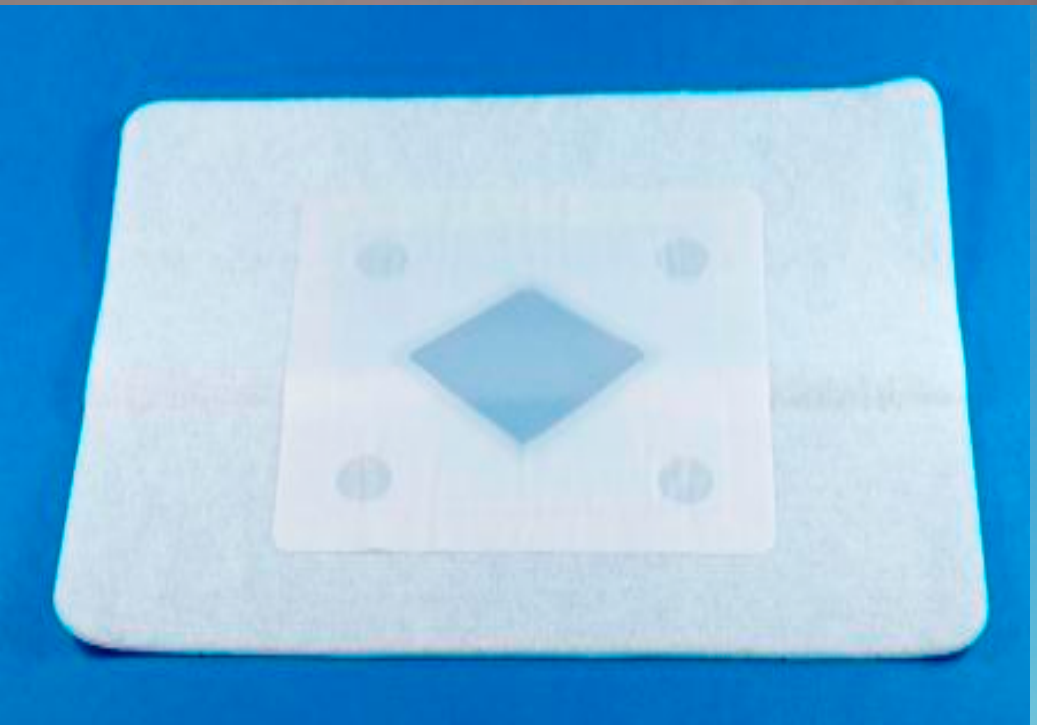
Secondary to penetrating wound.

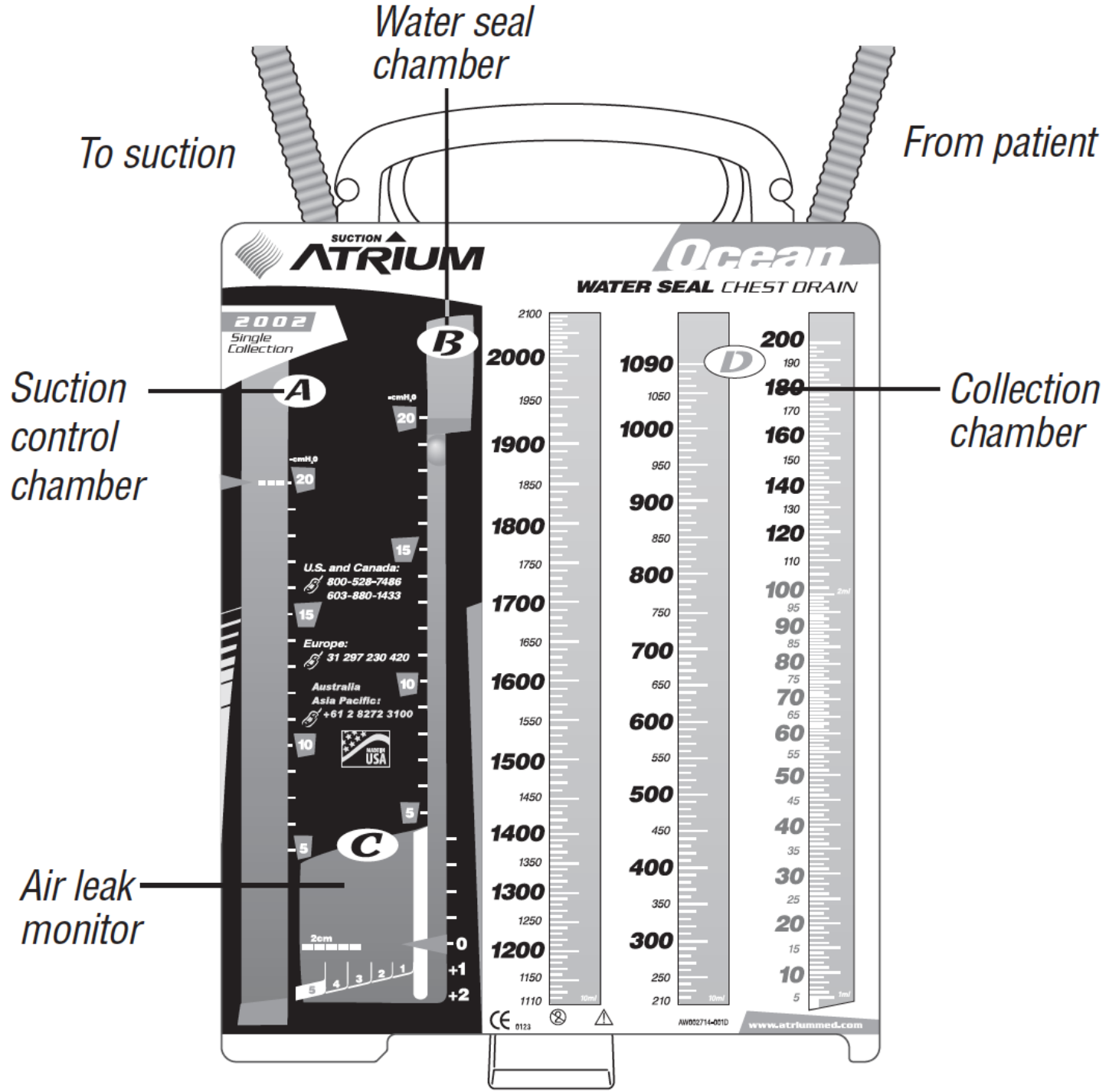
Diagnosis:

- Air may be heard passing in and out of the wound with breathing.

Treatment:

- High flow oxygen
- Analgesia
- Occlude wound with dressing (3 sides only to allow air to escape during expiration)
- Immediate Insertion of chest drain




Water seal chamber
To suction
From patient
Suction control chamber
Collection chamber
Air leak monitor
SUCTION ATRIUM
Ocean
WATER SEAL CHEST DRAIN
2002
Single Collection
A
B
C
D
-cmH2O
20
15
10
5
U.S. and Canada:
800-528-7486
603-880-1433
Europe:
31 297 230 420
Australia
Asia Pacific:
+61 2 8272 3100
MADE IN USA
2cm
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1ml
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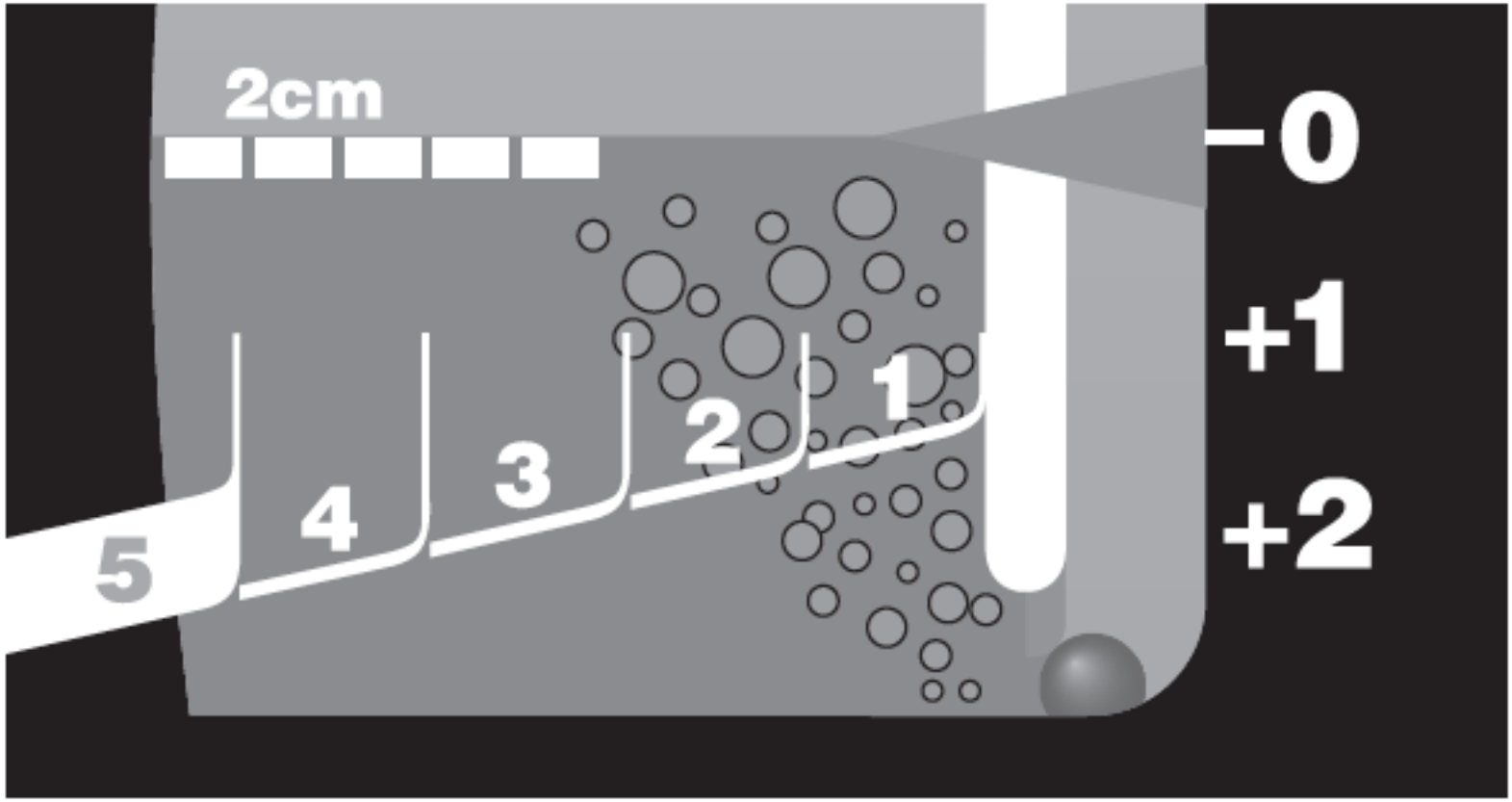
AW002714-001D
www.atriummed.com

Air Leak (bubbling)



Oscillation (swing)

- The water in the water seal chamber will rise and fall (swing) with respirations. This will diminish as the pneumothorax resolves.
- Watch for unexpected cessation of swing as this may indicate the tube is blocked or kinked.
- Cardiac surgical patients may have some of their drains in the mediastinum in which case there will be no swing in the water seal chamber.

Don’t Forget

Pain

- Chest tubes are painful as the parietal pleura is very sensitive. Patients require regular pain relief
- Pain assessment should be conducted frequently and documented

Physiotherapy

Drain insertion site

- Observe for signs of infection and inflammation and document findings
- Check dressing is clean and intact
- Observe sutures remain intact & secure (particularly long term drains where sutures may erode over time)

PITFALLS

- clot in chest tube *inside* patient
- clot in the patient tube
- dependent loop in patient tube with fluid
- kink in patient tube from bed rail or patient position
- partial dislodgement of catheter from patient
- partial disconnection of patient tube from chest tube connector
- overfilled water seal (water is above 2cm line)
- in-line connectors not properly secured
- patient tube clamp may be closed
- floor stand is not fully opened
- chest drain is not upright
- chest drain is not positioned sufficiently below patient's chest
- suction control is not bubbling due to insufficient suction regulation or poor connection
- suction control is bubbling too vigorously

Indications of Removal of Chest Drains

- Absence of an air leak (pneumothorax)
- Drainage diminishes to little or nothing
- No evidence of respiratory compromise
- Chest x-ray showing lung re-expansion