



Yorkshire and Humber Neonatal ODN

# How to place a "Cook" seldinger chest drain

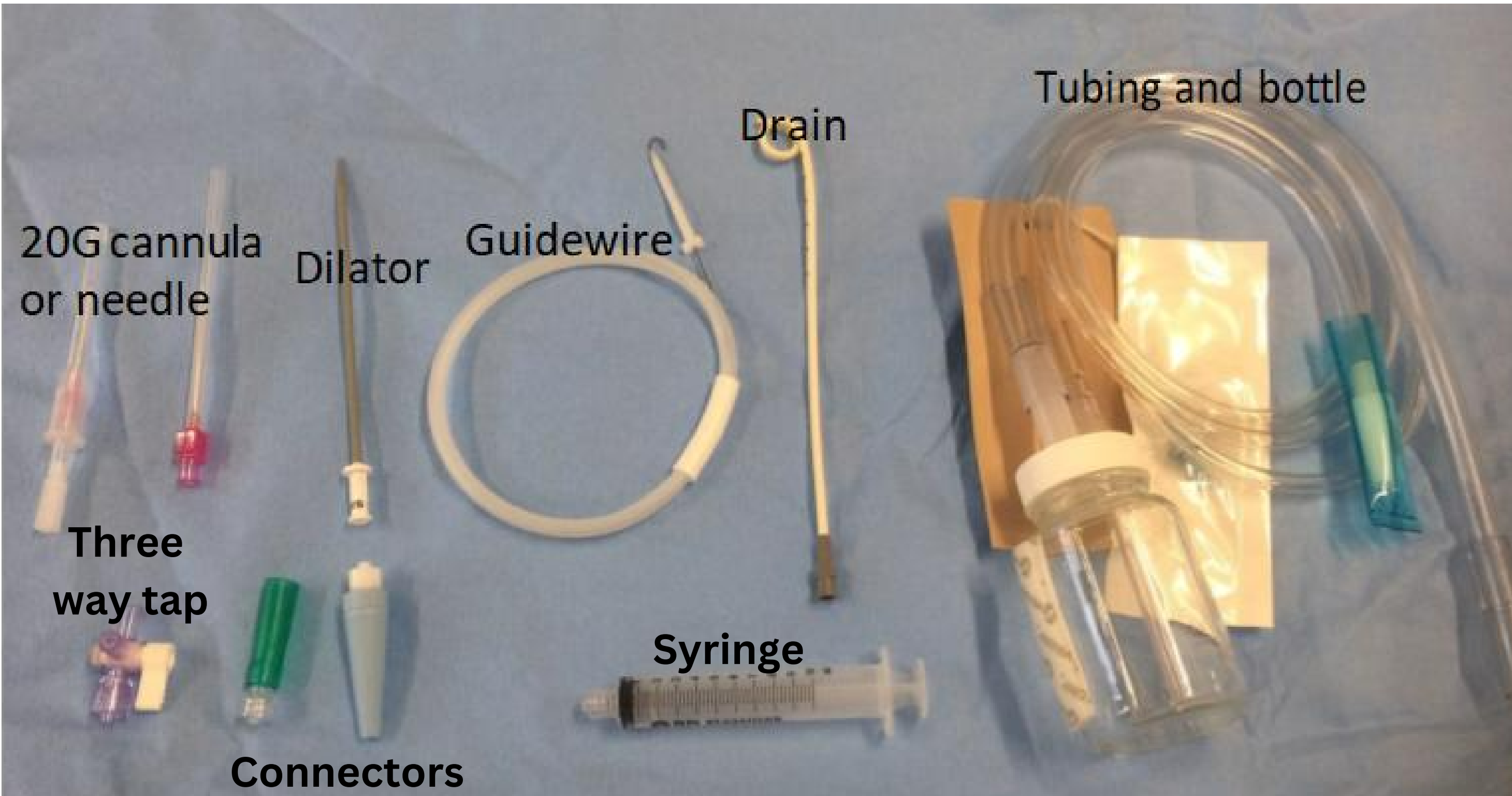
Based on previous NTNN procedure from Dr L Pilling  
Updated May 2023

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# Equipment required

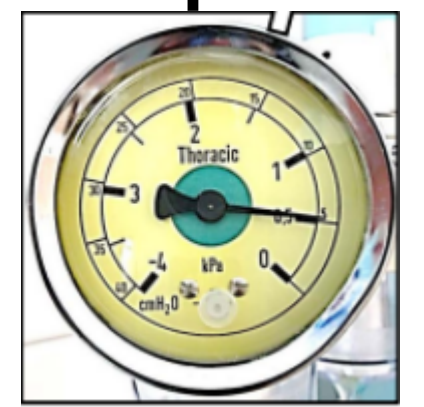
Remember additional needles (25G & drawing up needle) and syringe for lignocaine and procedural checklist if used locally



Fully sterile assistant



Thoracic suction if required



# Analgesia

- Ensure baby is continuously monitored
- Ensure baby has adequate analgesia
- If the patient is ventilated give a dose of fentanyl 3 micrograms/kg prior to the procedure (Morphine as an alternative).
- If the patient is not ventilated then a reduced dose of fentanyl 1 micrograms/kg should be considered
- Local infiltration with 1% lignocaine up to 0.3ml/kg should be used in all babies.

# Position

- The baby should lay supine
- Place the arm on the affected side above the head
- Turn the face away from the affected side



# Strict asepsis & identify insertion site

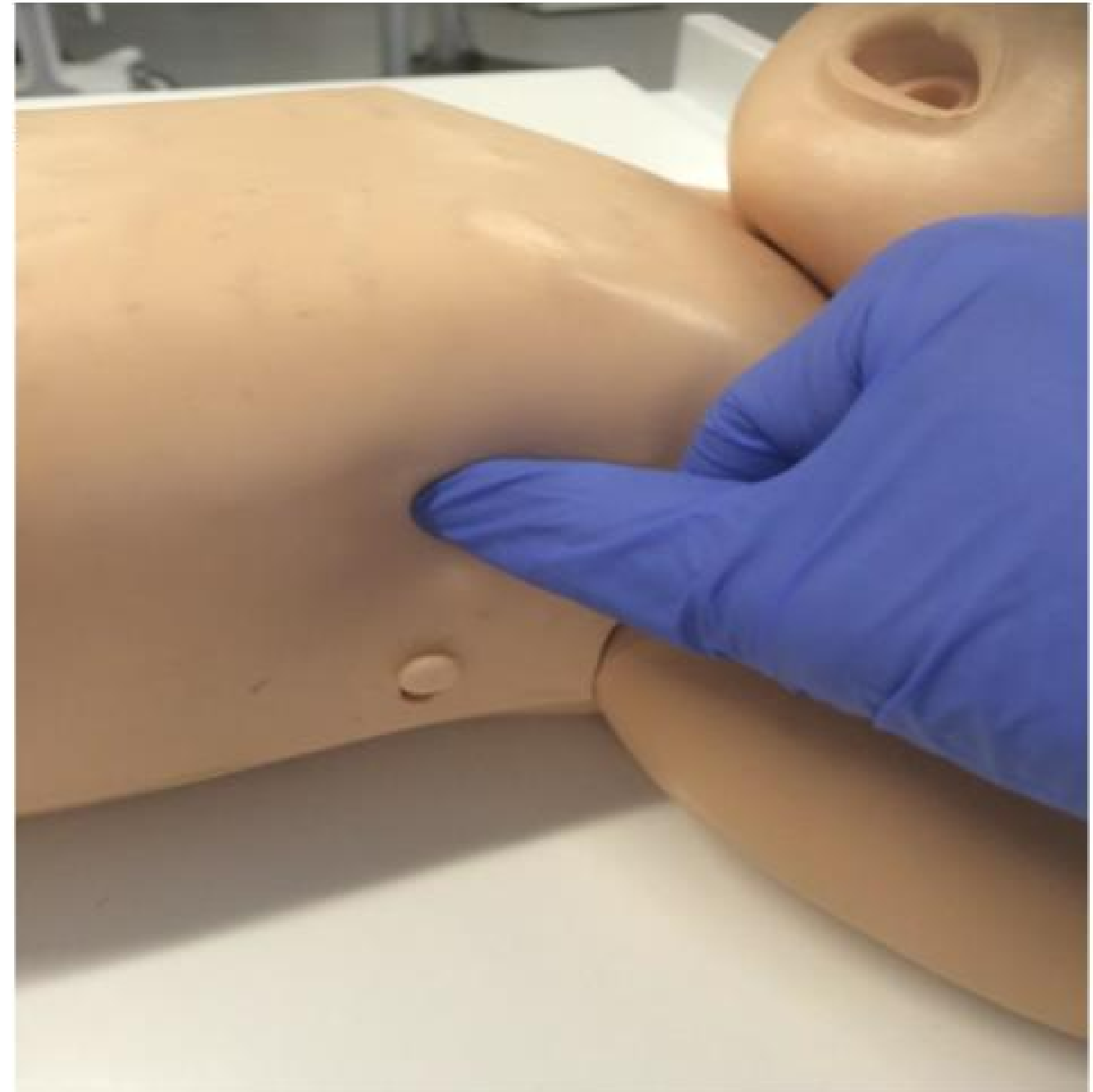
Full asepsis should be used: gown and gloves +/- hat and mask - as per local policy

Identify site, usually

4-5th intercostal space,  
just above 5th rib (to avoid  
neurovascular bundle),  
mid-axillary line

Clean skin according to local procedures and infiltrate with anaesthetic

When multiple drains required the mid-clavicular line, 2nd intercostal space may be used with consultant discussion



# Needle or cannula?

A 20G needle is available to use

A pink 20G cannula may be used instead

-The benefit being that once the soft tissues are breached the sharp needle may be slightly withdrawn, ensuring the underlying structures (lung, heart) are not damaged when advancing the device into the pleural space.

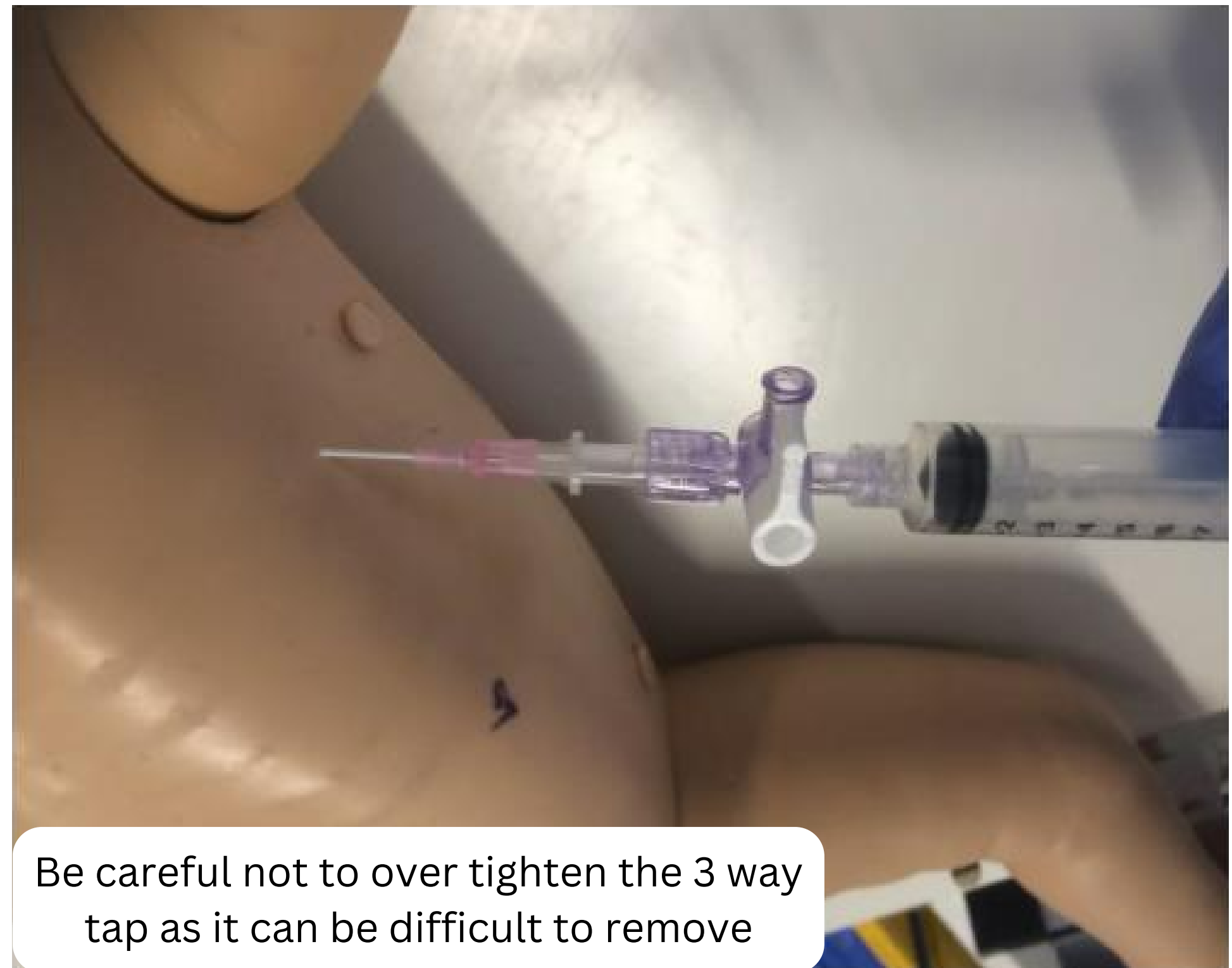


# Advancing the needle/cannula

Attach a three way tap and syringe to the end of the needle or cannula. Filling the syringe with 0.9% sodium chloride may aid seeing bubbles.

Advance through chest wall, aspirating the needle as you advance into the pleural space.

This may be less than 1cm in preterm babies.





# Insert the guidewire

- Once in the pleural space (air will be easily aspirated), remove three way tap and syringe
- If using a cannula, hold the outer plastic cannula securely in place & withdraw the needle
- Using your assistant, insert the guidewire introducer into the end of the needle/cannula
- Advance the guidewire into the pleural space
- There should be little resistance

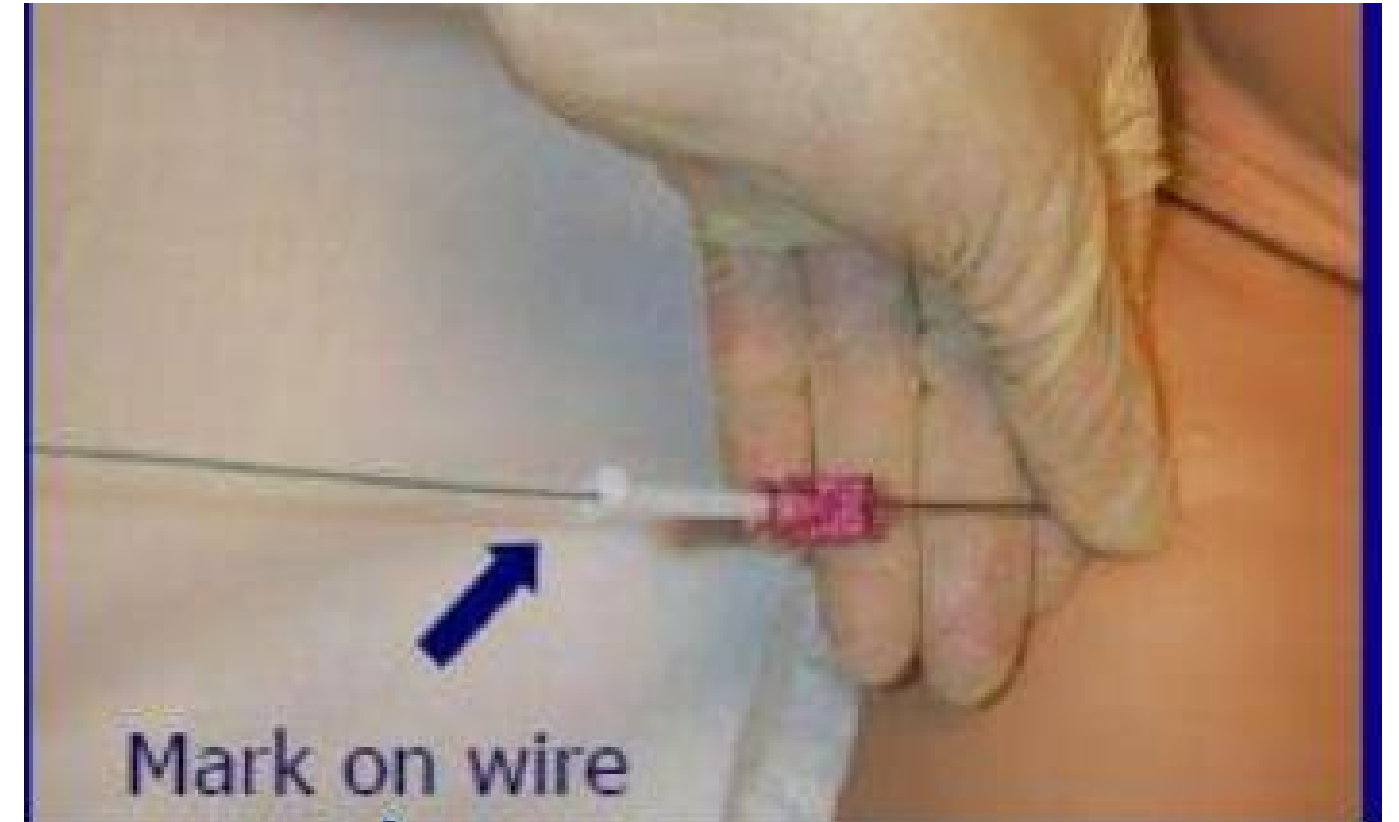


# Advance guidewire

Advance the guidewire to the mark on the wire

Remove the cannula/needle, ensuring the guidewire remains in place and does not move

Use assistant to hold the guidewire in place and "control" it



# Stretch the soft tissues

- Using the assistant, pass the dilator over the guidewire
- Advance ~1cm through the skin to stretch the entry port for the drain.
- The skin may require a small incision to help
- Aim anteriorly
- The dilator can then be removed (wire remains in place)



# Insert the drain

- Advance the drain over the wire (usually required assistance)
- Advance the drain to at least the first black mark. Think about chest wall depth, may need advancing further in an oedematous/macrosomic baby.
- Hold the drain in place, remove the wire



# Under water seal or flutter valve?

An underwater seal is considered the **Gold Standard** but the priority is that the system is used correctly so units should decide based on their own staff confidence/competence with each system.



**Underwater seal**



**Flutter valve**

# Setting up an underwater seal

This guide shows the set up of an Argyle infant glass bottle chest drainage system

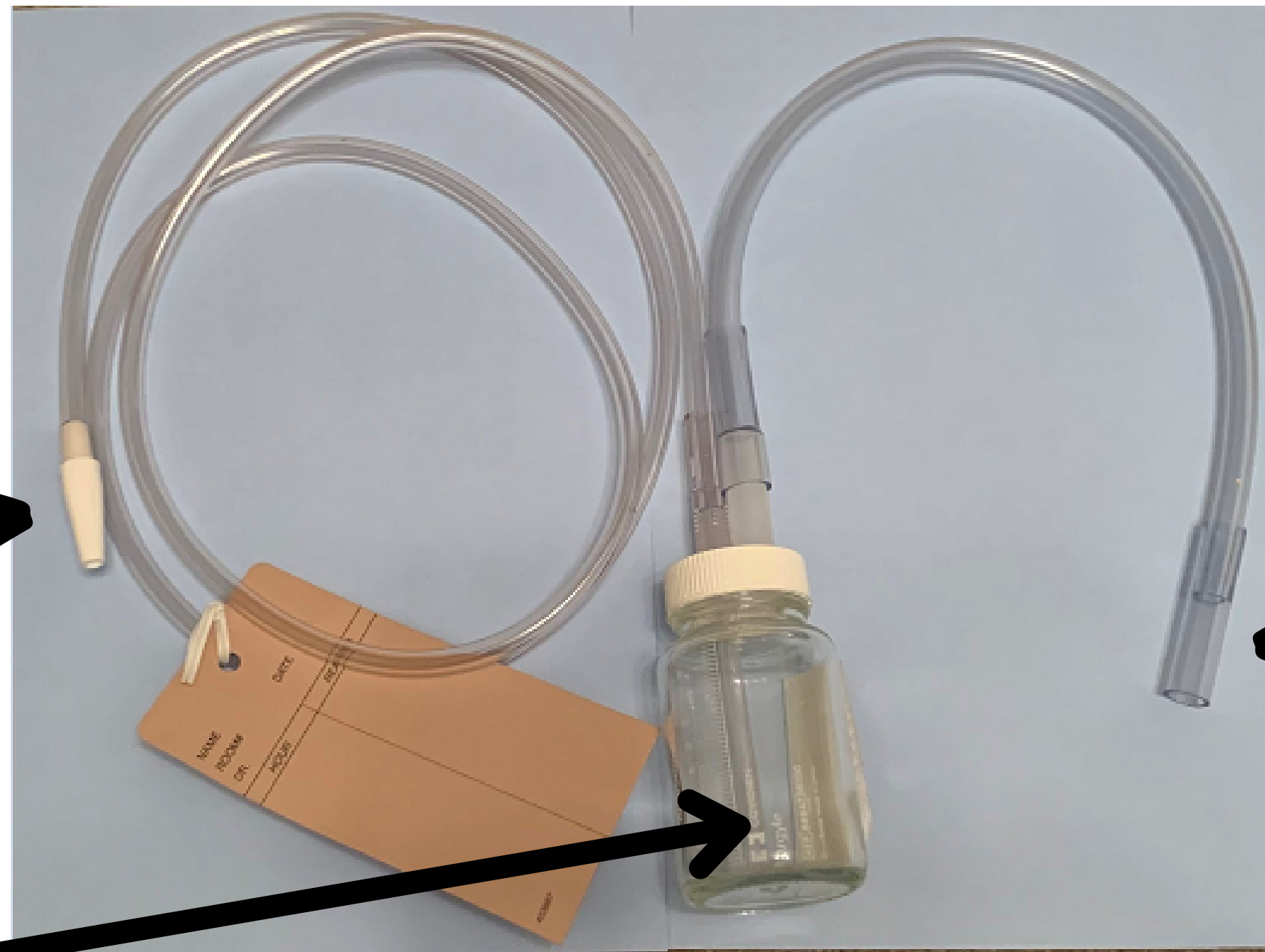
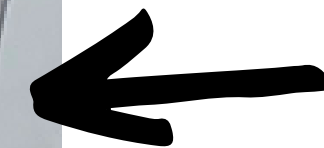
This end attaches to the chest drain



Fill to water level seal line, with approx. 20mls of sterile water to create a water seal



This end attaches to suction or is left open to air



# Attaching the under water seal

There are 2 ways to attach the chest drain to the under water seal system

## Set up option 1

Connect chest drain to 3 way tap

Ensure 3 way tap is open and a bung is on the closed end

Attach 3 way tap to green vygon connector code (800.01)

Attach Vygon connector to white plastic end of under water seal drainage system



# Attaching the under water seal

There are 2 ways to attach the chest drain to the under water seal system

## Set up option 2

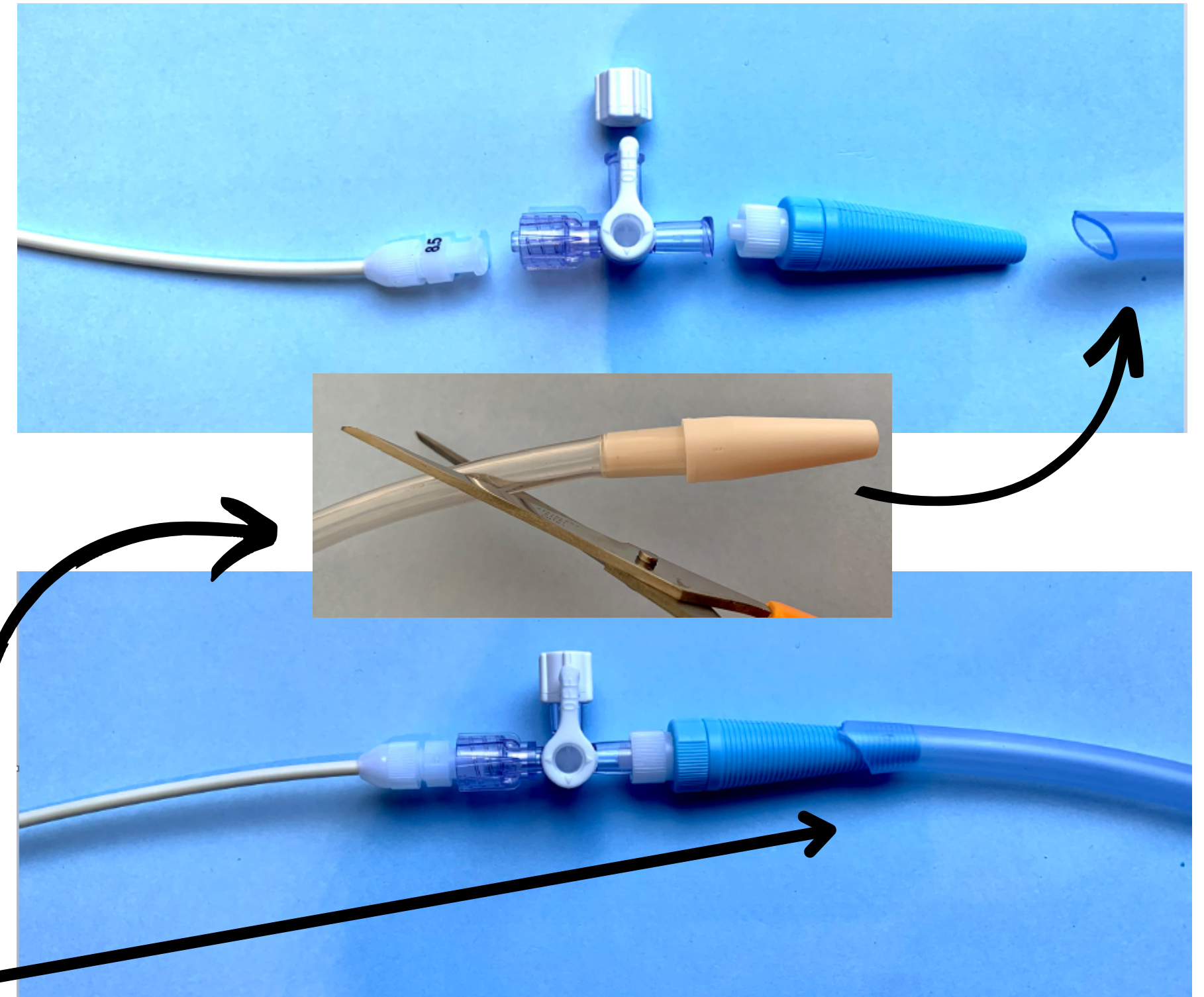
Connect chest drain to 3 way tap

Ensure 3 way tap is open and a bung is on the closed end

Attach 3 way tap to male end of blue connector (connector comes in under water seal pack)

Cut the under water seal drainage tubing at an angle removing the white end

Attach blue part of connector to cut tubing, it might be quite stiff

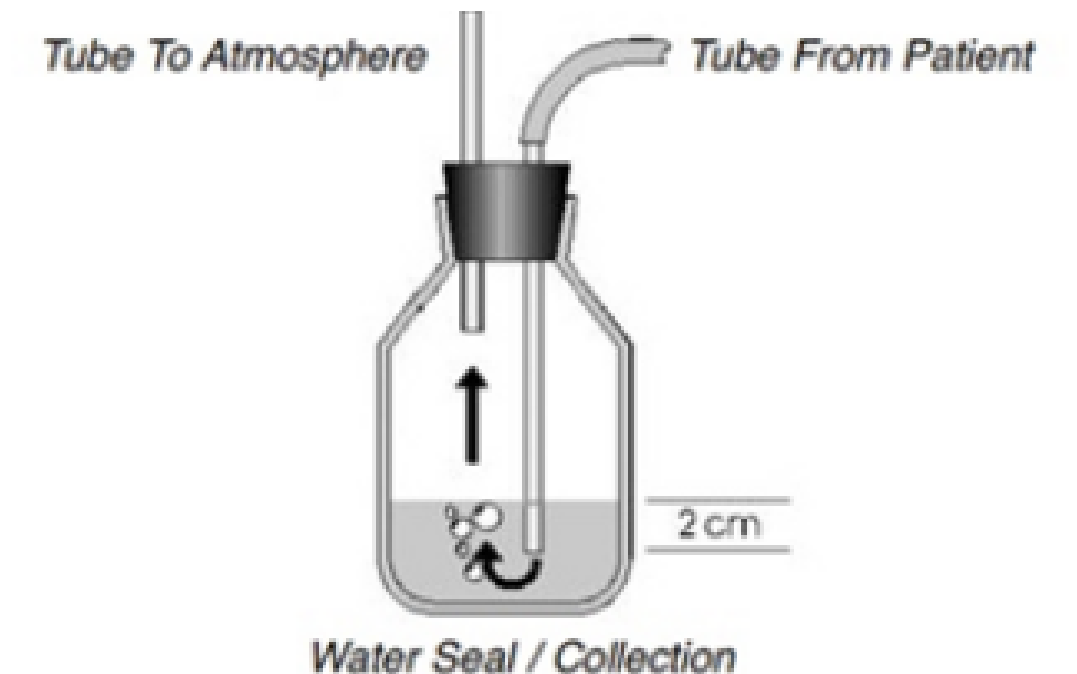
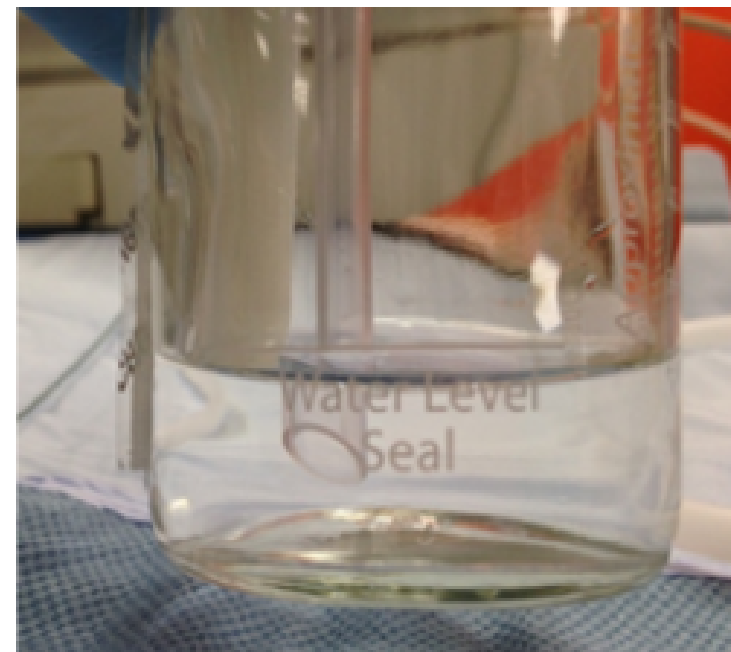




# Setting up an underwater seal

Fill the bottle to the water level seal line with approx. 20mls of sterile water to create a water seal (the end of the drain must be submerged by 2cm at all times)

Bottle must be kept below patient at all times



# Securing the drain

- Sutures are not usually necessary
- "Sandwich" the drain between two pieces of Tegaderm
- If necessary a suture through the skin and tied around the drain may be used
- Do not use a purse string suture
  - this is unnecessary and may leave a scar

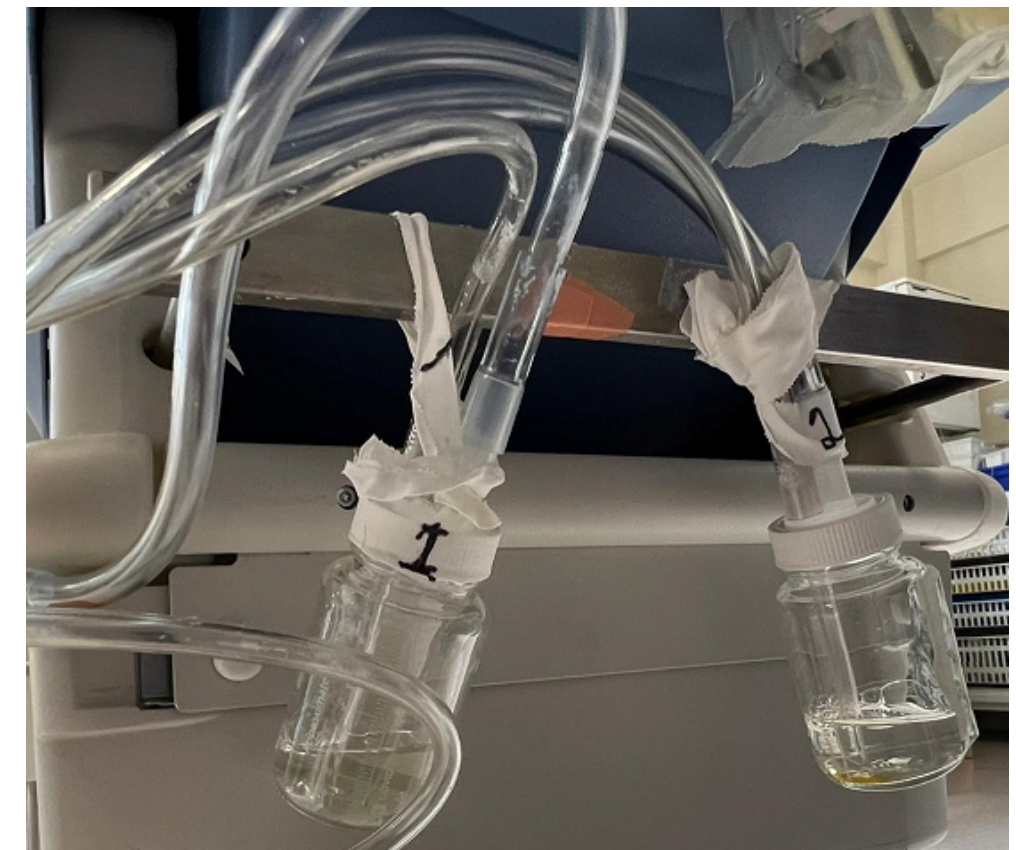
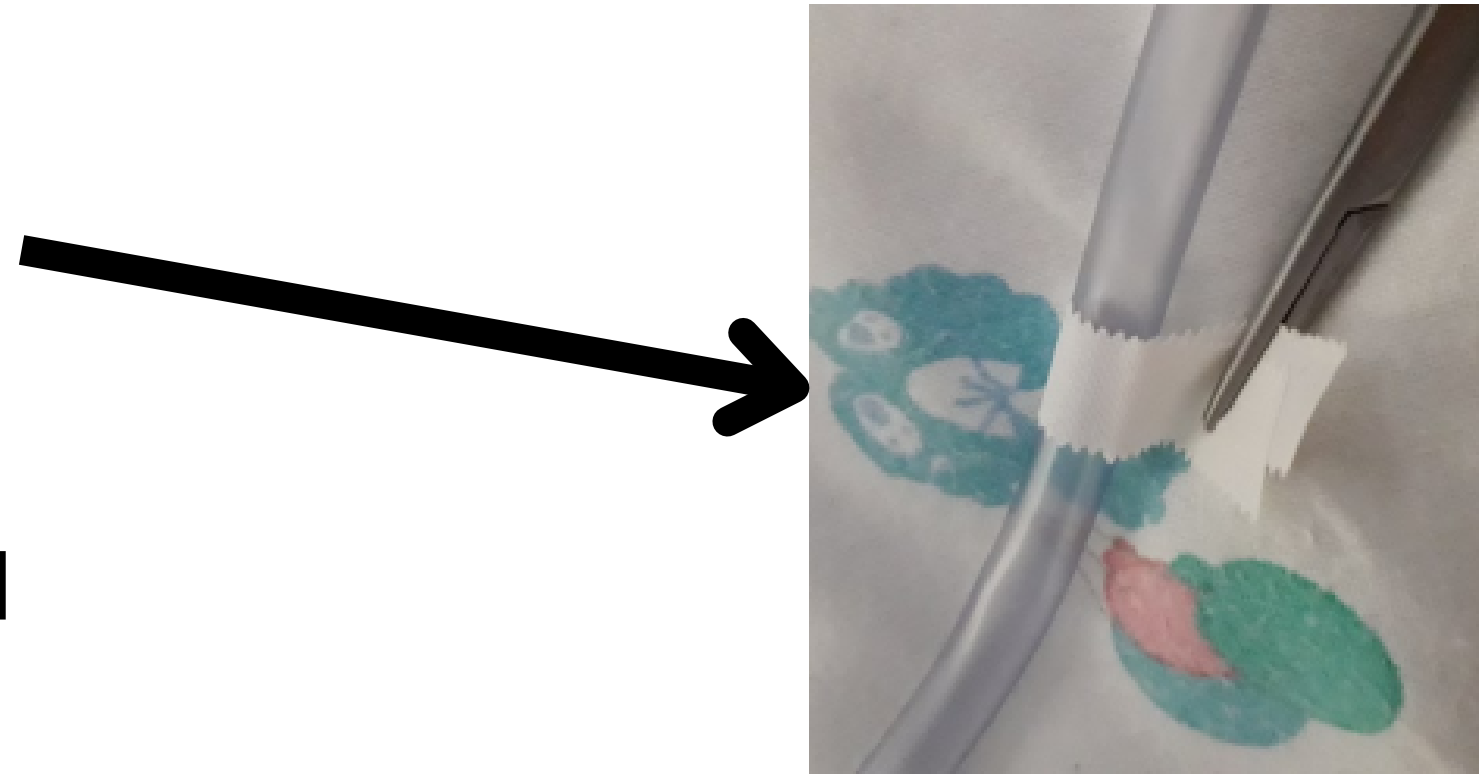
# Securing to the incubator

Place zinc oxide around drainage tubing and clamp to bed sheets to prevent pulling

Bottles should be securely attached to the incubator - where this will be is incubator dependant

Don't rely on sticky pads that come attached to some bottles additional tape will be needed

**Ensure bottles are below patient at all times**



# Connection to Suction

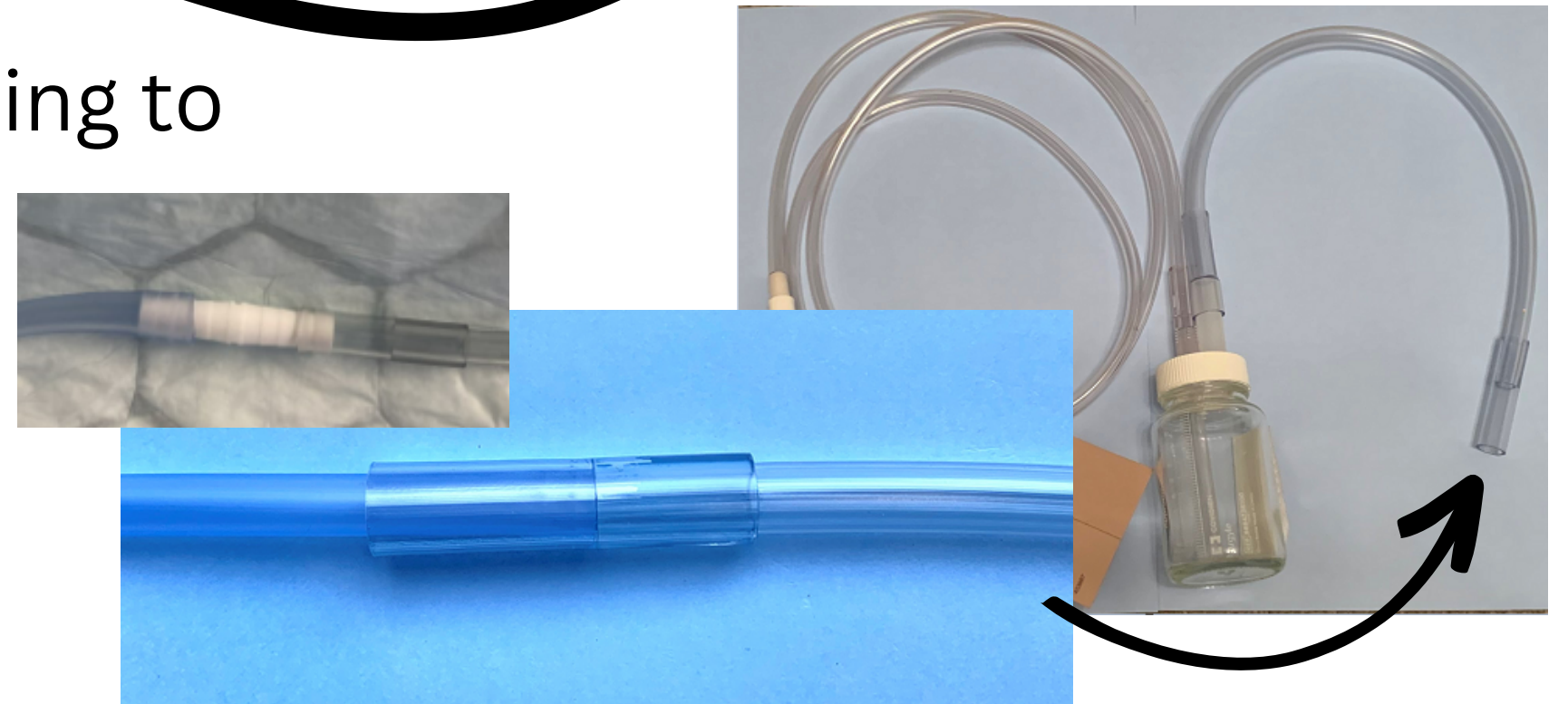
The decision to connect to suction is a medical one, if not required the short end of the drainage system is left open to air.

If suction is required its usually set between  
**5-15cmH20/0.5-1.5 kPa**

You need a thoracic suction port to deliver this,  
low vacuum suction is too high

Connect the short end of the drainage tubing to  
suction if in use

Most suction tubing slots inside the  
drainage tubing and can be secured with  
tape but connectors are also available

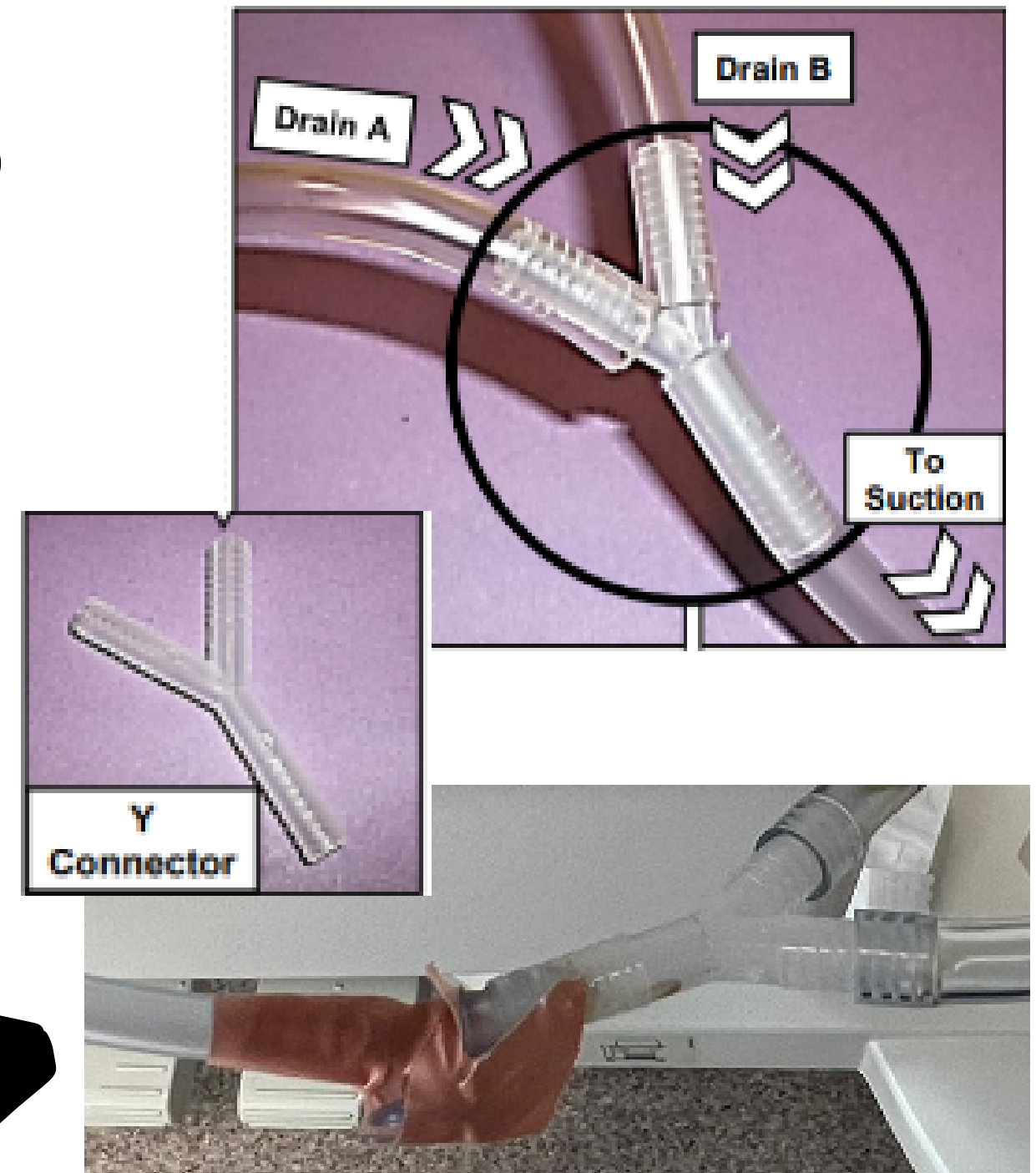


# Multiple Drains

Label all drains appropriately at both the chest drainage tubing and each bottle

If the drains require suction you will need a Y connector this will allow you to connect 2 drains to one suction unit

Some types of suction tubing connect directly while others need the catheter part to connect and to be secured with tape



# Monitoring

**Hourly checks** and **documentation** of **tubing** for kinks, or tension, signs of **bubbling/swinging** in tubing and drainage set, **volume and colour of liquid** (depending of type of drain), correct **suction pressure** (if required) and **dressing integrity**

## **Bubbling**

- Bubbling of air through the water in the bottle should be seen when the patient exhales
- Continuous bubbling may indicate a leak in the system and it should be checked for disconnection

## **Swinging**

- Swinging of the water level in the seal chamber will rise and fall as the pneumothorax resolves
- This will diminish as the pneumothorax resolves
- Sudden loss of swing may indicate blockage or kinking of the tube and should be looked for.

# Emergency Equipment

At the bedside you will need:

- 2 chest drain clamps non toothed (or artery forceps)
- A pack of sterile gauze
- A Tegaderm dressing



**Please Note:** The tubing should only be clamped when changing the drainage bottle or if the tubing becomes disconnected, requires the inclusion of a Y connector, or on specific medical instruction.

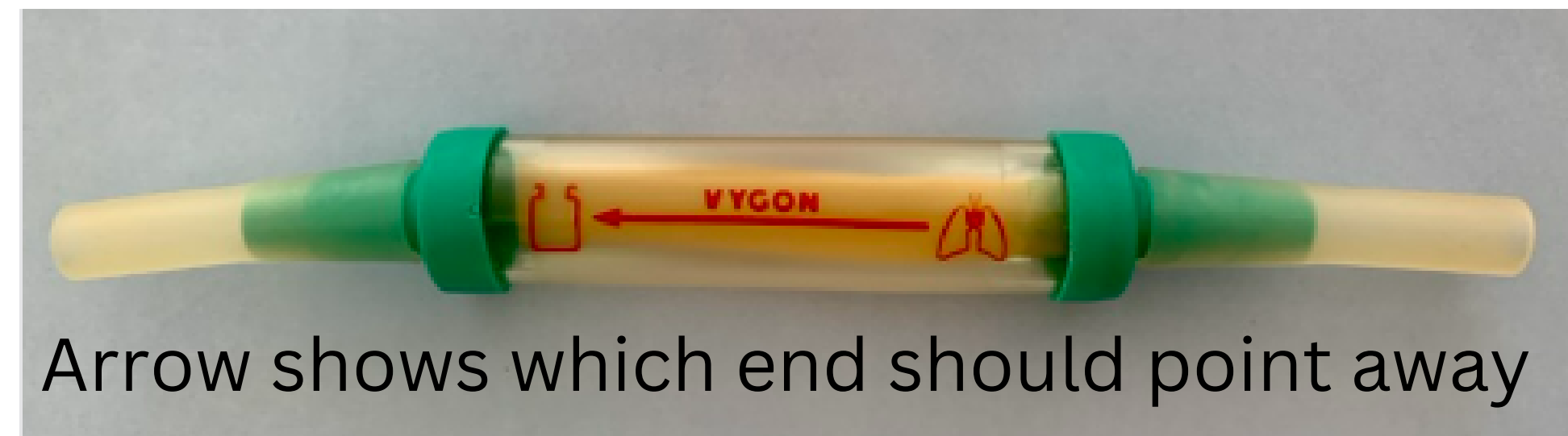
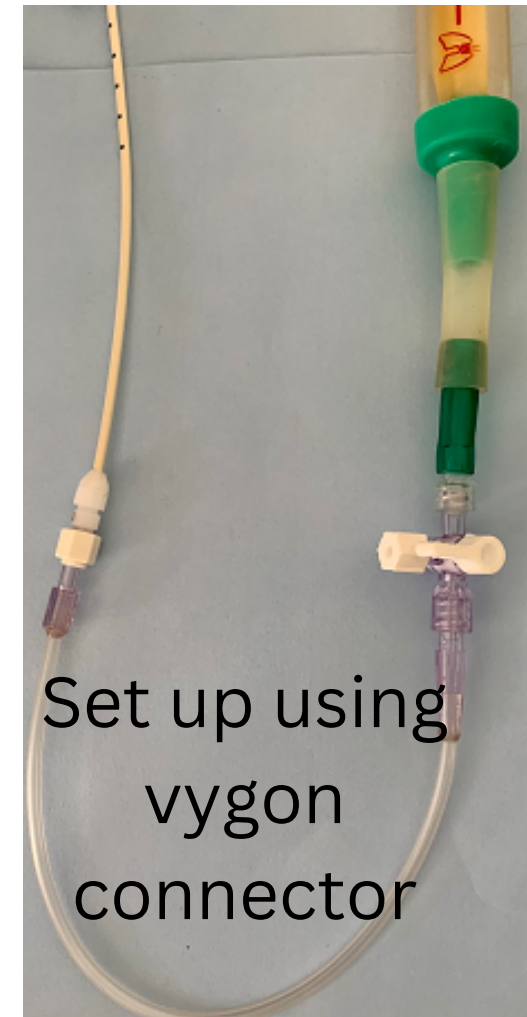
# Attaching a flutter valve

Attach three way tap, extension tubing and connector to flutter valve

The flutter valve is clearly labelled as to which end to attach.

Perform and document hourly observations including:

- Flutter-report to medical staff if the drain stops fluttering
- Drain site
- Tubing for connection and kinks





# Removing the drain

- Leave drain in situ for 24 hours after bubbling has stopped
- Consider clamping the drain using artery forceps/closing the 3 way tap for 4-6 hours. If transparent tubing is filled with static serous fluid, clamping may not be necessary. Consider re-x-ray (earlier if symptomatic). If there is no reaccumulation then proceed to removal.
- Gather equipment:
  - sterile pack
  - Sterile gloves
  - Steristrips
  - Tegaderm
- Clean the area, gently removing the Tegaderm
- Remove the drain, immediately occluding the incision site (line tip can be sent for MC&S as per local protocol)
- Close entry site with Steristrips, applying Tegaderm over this.
- Re-x-ray after 2 hours unless clinical deterioration before.

# Shared learning

As its a procedure that isn't performed everyday and often is performed in a stressful enviroment it can help to have equipment together ready to go. Here are a few examples units have used

