

CHEST TUBES

Key points

There are two different types of chest tubes that may be inserted:

- Trocar catheter: rigid, large bore, straight tubing
 - Associated with less discomfort, usually better tolerated and less need for analgesia
 - Not sutured so less secure
- Pigtail: soft, small bore, flexible catheter with tightly coiled end
 - Better if you need to drain viscous fluid
 - Sutured
- Clamping the chest tube requires a medical order except for when managing an accidental disconnection, assessing an air leak or changing the chest tube drainage system. For these interventions, the tube should be clamped as briefly as possible. **Clamping a chest tube in the context of a pneumothorax can lead to a tension pneumothorax and patient deterioration.**
- The chest tube drainage system must remain below the level of the chest at all times, hanging off the bar at the foot of the incubator. Tubing must not be draped over bedrail.
- Do not strip or milk the tubing as this could cause excessive negative pressure and could damage lung tissue.
- Suction or flushing of a chest tube as well as administration of a medication via chest tube can be done by a physician only.

Setting up chest tube drainage system

Material

- Neonatal chest tube drainage system (150 ml)
- Suction manometer
- Suction tubing
- Tubing connector
- Waterproof tape
- Adhesive dressing (i.e Sorbaview)
- Safety pins

Procedure

NOTE: Chest tube drainage system has 3 main components (see picture below):

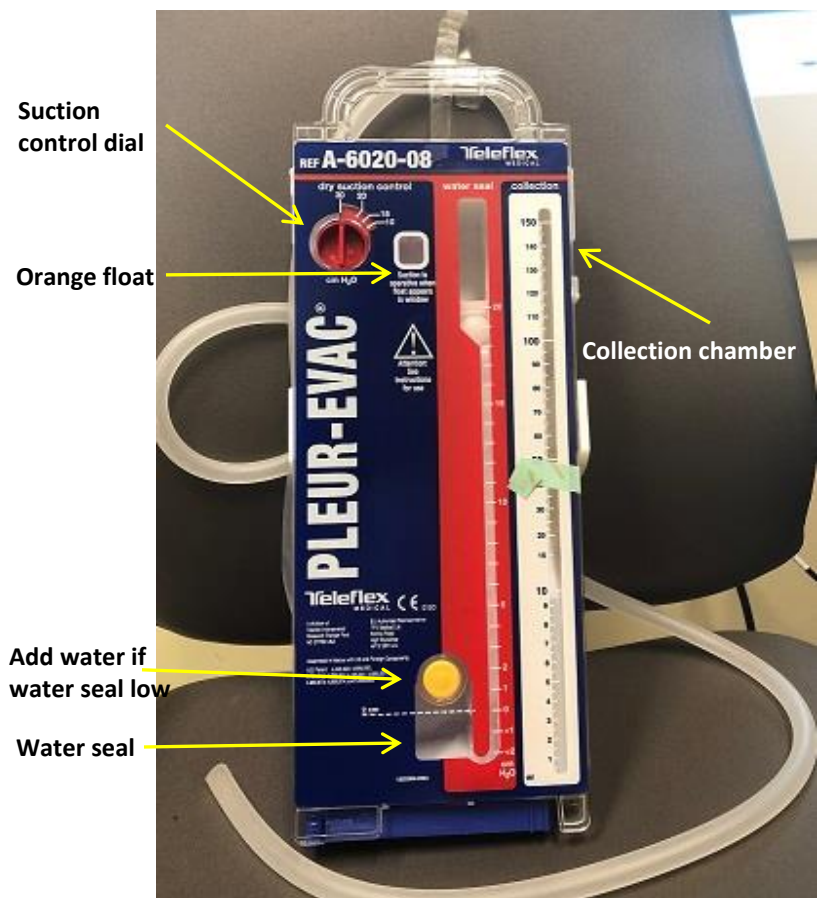
Collection chamber: collects fluid or air

Water seal: Maintains negative pressure; allows from fluid/air to leave cavity but not return

Suction control chamber: Controls the amount of suction applied to the pleural cavity (regardless of manometer pressure)

1. Open chest tube drainage system package and maintain sterility of soft tubing tip (yellow cap should remain in place).
2. Fill the water seal chamber through the suction outlet to the 2 cm level using the bottle of sterile water provided.
3. If need for suction anticipated, ensure manometer in place on wall suction outlet. Test to ensure set up is functional then turn off until required.
4. Attach suction tubing to the manometer and connect directly to drainage system (do not use a suction canister). Note that most patients will require two lengths of suction tubing joined with tubing connector, solidified with waterproof tape.
5. Once the chest tube is inserted, remove yellow cap of soft tubing on chest tube drainage system. Using no-touch technique (NTT), connect the adapter of the soft tubing to the chest tube. Note: If tube inserted is a pigtail catheter, the soft tubing must be cut with sterile scissors below the adapter to remove it as it will not fit on pigtail. A special luer-lock

- connector (provided in package with pigtail tube) must be attached to the pigtail catheter to enable connection to the soft tubing. This blue adapter should be placed on the distal end of the pigtail catheter by the chest tube inserter while sterile.
6. Apply gauze and adhesive dressing to the insertion site using the NTT.
 7. Secure chest tube to chest wall using waterproof tape or fixation device such as GripLok. Depending on age and size of the patient, consider putting a protective dressing (i.e. Duoderm) underneath the tape or fixation device.
 8. If suction is ordered, turn the suction control dial on the chest tube drainage system to the ordered pressure level. Turn the suction on via the manometer. Increase suction on manometer until the orange float appears in the suction indicator window. The position of the suction control dial determines the amount of suction regardless of how much suction is applied as long as the orange float appears in the indicator window.
 9. Wrap connection between trocar catheter and soft tubing with waterproof tape. The waterproof tape is folded around the tubing to form a flag to which the safety pin can be attached.
 10. Secure tubing to the bed linen using waterproof tape and safety pins.
 11. A chest X-ray is usually requested to verify tube placement.



Assessment, monitoring & documentation immediately post chest tube insertion

Assessment/monitoring	Frequency
Respiratory assessment	Prior to procedure, as baseline Q 15 mins for 1 hour post procedure, then routine if stable
Vital signs (including pain/sedation score)	Prior to procedure as baseline Q 15 mins for 1 hour post procedure, then routine if stable Note: Temperature should be taken as baseline and then as per unit policy. If on ISC probe, take as above
Drainage (quantity/aspect)	Q 15 mins for 1 hour post procedure, then routine if stable
Functioning of chest tube (water seal*)	Q 15 mins for 1 hour post procedure, then routine if stable

*It is expected to see bubbling in the water seal chamber as air is being drained from pleural cavity. Persistent bubbling is a sign of continuous air leak, either from the drainage system or lung itself.

Routine assessment, monitoring & documentation of chest tube

Assessment/monitoring	Parameters	Frequency
Respiratory assessment	Air entry, work of breathing	Q check + PRN
Vitals signs	HR, RR, BP, SpO2, Temperature, Pain/sedation score	Minimally Q check + PRN If patient on continuous cardiorespiratory monitoring, vital signs should be monitored Q1 hr + PRN
Insertion site and dressing integrity	Assess area around insertion site for air leak, redness, swelling or leakage Assess dressing for integrity	Q check + PRN
Functioning of chest tube drainage system	Integrity of system (all connection taped, no kinks) Water seal level at 2 cm mark Suction control set as ordered and orange float visible If applicable, fluctuation of water seal (in smaller patient, this may not be visible)	Q 1 hr + PRN
Drainage	Quality and quantity (both per hour and cumulative) of drainage	Notify MD if: <ul style="list-style-type: none"> ➤ > 5ml/kg/hr of drainage in 1 hr ➤ > 3 ml/kg/hr of drainage for 3 hours ➤ A sudden increase or decrease in output

Dressing change

Change dressing only if soiled, loose or no longer occlusive. Routine dressing change is no longer recommended. For pigtail catheters, a second person with sterile gloves will be required to maintain the catheter in place while the dressing is removed as this type of tube is usually not sutured.

See protocol for detailed procedure.

Specimen collection

The neonatal chest tube drainage system does not have a sampling port on the drainage tubing. According to the manufacturer, the drainage tubing is re-sealable therefore piercing the tubing with a small gauge needle will not result in loss of system integrity. **In order to collect sample, you must use a 21G needle and pierce the tubing at a small angle (< 30 degrees).**

See protocol for detailed procedure.

Changing the chest tube drainage system

Change the chest tube drainage system when nearly full, if the drainage system is cracked, or if level in the collection chamber is not easily identifiable (chest tube drainage system accidentally knocked over). The drainage system should also be changed in the context of an unresolved air leak. Note that this is a 2-person procedure in order to maintain sterility.

See protocol for detailed procedure.

Assisting with the removal of a chest tube

Removal of a chest tube is done by a surgeon, a critical care physician or a nurse practitioner (NP).

See protocol for detailed procedure

Assessment, monitoring & documentation immediately post chest tube removal

Assessment/monitoring	Parameters	Frequency
Respiratory assessment	Air entry, work of breathing	Prior to procedure as baseline Q 1 hr for 4 hours, then as per unit policy
Vital signs	HR, RR, BP, SpO ₂ , Temperature, Pain/sedation score	Prior to procedure as baseline Q 1 hr for 4 hours, then as per unit policy
Insertion site and dressing integrity	Assess area around insertion site for redness or swelling. Assess compressive dressing at site for excessive oozing or leakage.	Q 12 hrs If site dry, remove dressing after 2 days If site still oozing, clean site and replace dressing