

Chest Tube Management

The placement of a chest tube (thoracostomy tube) or catheter is a common procedure implemented to drain air, simple fluid, pus, blood, or to instill medications into the pleural space. Nurses play a vital role in maintaining chest tube system function and monitoring closely for signs of complications.

Indications (Carr et al., 2025)

- Pneumothorax: spontaneous, traumatic, iatrogenic, or tension
- Pneumomediastinum with extension of mediastinal air
- Air leak following pulmonary resection
- Bronchopleural fistula
- Hemothorax: traumatic, post-operative
- Empyema
- Pleural effusion
 - Simple effusion
 - Malignant effusion
 - Empyema
 - Chylothorax (accumulation of chyle, or lymph fluid, in the chest cavity)
 - Pleurodesis (adhering the pleural layers between the lung and pleural space to prevent air or fluid accumulation)

Insertion (Carr et al., 2025)

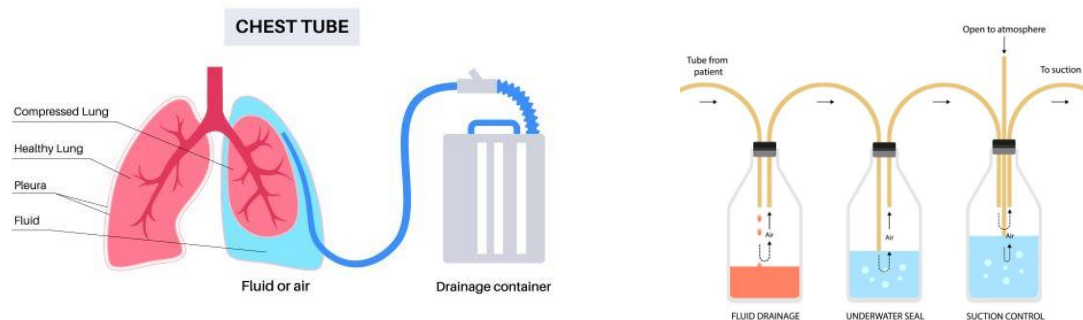
The choice of chest tube including size, diameter, shape and insertion site depends upon the clinical scenario, indication, and size of the patient. Two techniques are commonly used for the placement thoracostomy tubes and catheters.

- **Standard Technique (Blunt Dissection):** The standard technique is indicated for drainage of large effusions or hemothorax. Direct incision and blunt dissection allow finger entry to assess for adhesions within the pleural space.
 - Landmarks for insertion: 4-5th intercostal space, mid-axillary to anterior-axillary line, over top of the rib.
- **Seldinger Technique (Pigtail catheter):** drainage of pneumothorax, non-viscous fluid. Ultrasound guidance is commonly used. Insertion with needle under ultrasound guidance with guidewire directed catheter insertion.
 - Landmarks for Insertion: 5th intercostal space, mid-axillary line
- **Needle Thoracostomy*:** indicated for hemodynamically unstable patients with suspected tension pneumothorax. Allows for rapid/temporary needle decompression to stabilize patient prior to chest tube placement.
 - **Landmarks for decompression: 2nd intercostal space, mid-clavicular line**

Drainage Systems (Carr et al., 2025)

Following the placement of a thoracostomy tube or catheter, it is attached to a pleural drainage system. Wet or dry suction control, closed-drainage systems are most used and effective for the drainage of pleural fluid and air.

- Wet Suction (water seal) systems are most commonly used in practice, also known as Pleura-vac and consists of three chambers: the collection chamber, water seal chamber, and the wet suction chamber.
 - Collection Chamber: collects fluid and air.
 - Water Seal Chamber: acts as a one-way valve to allow air and fluid to leave the pleural space, but not to re-enter. *Continuous bubbling in the water seal chamber indicates an air-leak*
 - Suction Chamber: the suction level is determined by the amount of sterile water instilled in this chamber (-20cm H₂O is commonly prescribed). This helps to maintain consistent negative pressure to keep the lung expanded and aids in removal of fluid/air.



Nursing Assessment/Management

- **Routine Care & Maintenance**
 - Keep insertion site clean and dry; change dressing per protocol and assess daily for signs of infection.
 - Make sure drainage system remains below chest level to prevent retrograde flow.
 - Maintain and ensure tube patency: check tubing for kinks or obstruction. Do not milk or flush a chest tube without provider order and supervision.
 - Provide adequate analgesia.
 - Encourage cough/deep breathing, and early mobilization (if allowed).
- **Monitoring & Documentation**
 - Record drainage volume, color, and consistency as ordered
 - Note presence/absence of tidaling (movement of fluid in the water-seal chamber, rising with inspiration, falling with expiration) and document and report changes.

- Absence of tidaling may signal tube occlusion or malfunction.
- Evaluate for air leak: persistent bubbling in the water-seal chamber may indicate ongoing intrathoracic air leak (e.g., from bronchopleural fistula) or leak in the drainage system.

Troubleshooting:

Problem / Sign	Possible Cause	Nursing Action
No tidaling in water-seal chamber	Obstruction (clot, kink) or lung re-expansion / no more air/fluid drainage	Check tubing for kinks; if none, alert provider, avoid routine stripping without order.
Sudden increase in drainage or bloody fluid	Bleeding complication, vascular injury, re-bleed	Notify surgeon/provider immediately; monitor hemodynamics, prepare for possible further intervention.
Continuous vigorous bubbling	Persistent air leak (bronchopleural fistula) or system leak	Check all connections, insertion site, notify provider.
Drainage system not below chest level, or tubing elevated	Risk of backflow of fluids/air into pleural space	Reposition drainage system below chest; ensure secure tubing and drainage unit.
Chest tube dislodgement	Accidental removal, poor securement	Immediately cover insertion site with sterile occlusive dressing and tape on 3 sides to allow air to escape but prevent air from entering the pleural space. Notify provider immediately/call RRT. Monitor for patient decompensation.

References

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