Chest Tube Placement

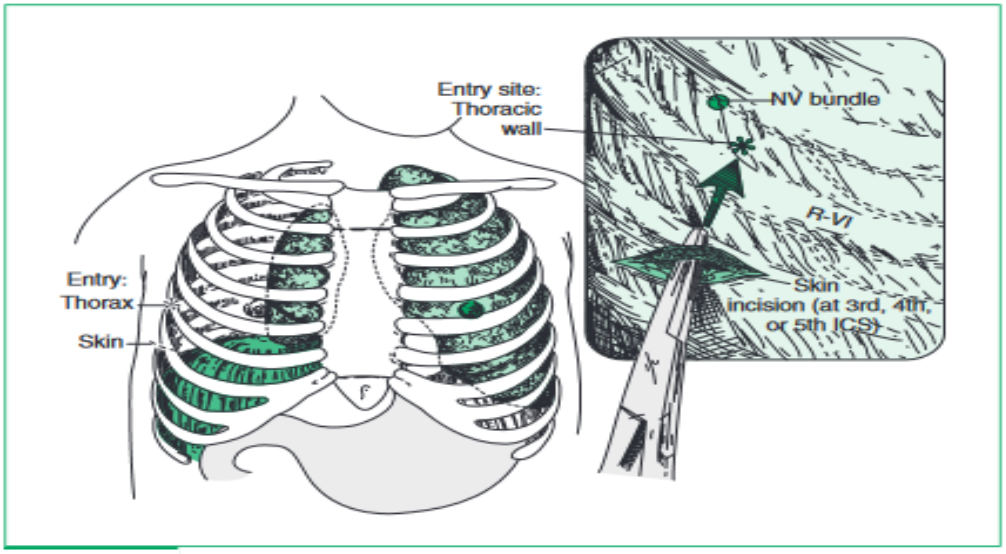
1. **Indications**: Evacuation of a pneumothorax, hemothorax, chylothorax, large pleural effusion, or empyema for diagnostic or therapeutic purposes.
2. **Complications**: Infection, bleeding, pneumothorax, hemothorax, pulmonary contusion or laceration, puncture of diaphragm, spleen, or liver, or bronchopleural fistula.
3. **Procedure**
    a. See inside front cover for chest tube sizes.
    b. Position child supine or with affected side up and arm restrained overhead.
    c. Point of entry is the third to fifth intercostal space in the mid- to anterior axillary line, usually at the level of the nipple (avoid breast tissue).
    d. Prepare skin and drape in a sterile fashion.
    e. Patient may require sedation, Locally anesthetize skin, subcutaneous tissue, periosteum of rib, chest wall muscles, and pleura with 1% lidocaine.
    f. Make a sterile 1- to 3-cm incision one intercostal space below desired insertion point, and bluntly dissect with a hemostat through tissue layers until the superior portion of the rib is reached, avoiding the neurovascular bundle on the inferior portion of the rib.
    g. Push hemostat over the top of the rib, through pleura, and into pleural space. Enter the pleural space cautiously and not deeper than 1 cm. Spread hemostat to open, place chest tube in clamp, and guide through entry site to desired distance.
    h. For pneumothorax, insert tube anteriorly toward the apex. For pleural effusion, direct tube inferiorly and posteriorly.
    i. Secure chest tube with sutures, first suturing a “purse string” of continuous running sutures encircling approximately a square centimeter around the site of insertion. This is placed such that an equal length emerges both from where the purse string enters and exits the skin. The purse string is tightened with a surgical knot at the skin. Then wrap both free ends of suture multiple times around the tube in opposite directions, tying after at least 7 wraps have been

performed to form a braided or “ballerina slipper” pattern on the tube. Make sure that the wraps are closely placed and tight around the insertion site near where the drain enters the skin. This improves retention of the tube should it accidentally be pulled. An additional anchor is recommended by securely taping the chest tube to the chest several inches caudal from the insertion site to the patient’s flank.

j. Attach to a drainage system with 20–30 cm H2O or water seal.

k. Apply a sterile occlusive dressing with petroleum gauze at the insertion site.

l. Confirm position and function with chest radiograph



Technique for insertion of chest tube. ICS, Intercostal space; NV, neurovascular; R-VI, sixth rib. *(Modified from Fleisher G, Ludwig S.* Pediatric Emergency Medicine. *3rd ed. Baltimore: Williams & Wilkins; 2000.)*