Chest Tube Placement

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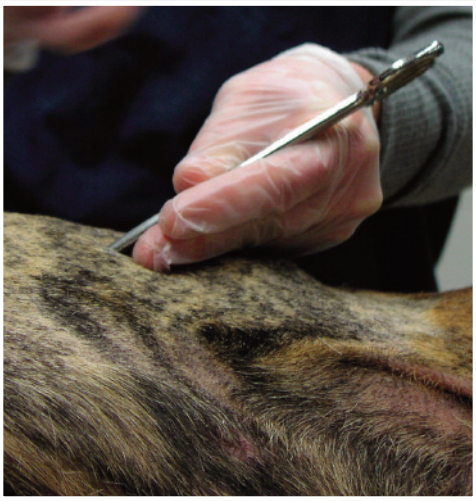

Chest tube placement (ie, tube thoracostomy) plays an important role in the management of severe pleural space disease. Chest tubes are indicated for managing unresolving pneumothorax, pyothorax, persistent pleural space disease requiring multiple thoracenteses, and postoperative thoracotomies.

Chest tube placement can often be performed under controlled conditions, with the patient sedated and intubated to allow regulation of breathing. Sometimes, however, a chest tube needs to be placed emergently or in a nonintubated patient and requires firm knowledge of the procedure.

In a noncrisis, adequate general anesthesia should be induced with placement of an endotracheal tube, allowing the patient to breathe on its own. If oxygenation is inadequate because of severe pleural space disease, gentle positive-pressure ventilation can be applied. In addition, an incision can be made into the chest cavity to relieve tension pneumothorax, with care to support ventilation, as the normal negative pressure within the chest is no longer present.

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What You Will Need

- Thoracostomy tube (comparable in size to the diameter of the patient's mainstem bronchus as determined by lateral radiography)
- Sterile surgical pack (ie, blade, blade handle, needle drivers, suture scissors, drapes, straight Kelly hemostats)
- Suture material for skin closure and to secure tube (3-0 nylon for the skin, polydioxanone for tube)
- C-clamp for tube occlusion
- Christmas tree adapter, zip-tie, and 3-way stopcock for the end of the chest tube

Step-by-Step ■ Chest Tube Placement

Step 1

Once the patient is intubated and stable under anesthesia with adequate oxygen saturation readings, position the patient in lateral recumbency (either side) and widely clip the lateral thorax (from caudal to the thoracic limb to the caudal aspect of the last rib). Use an appropriately sized, sterile chest tube to measure the distance in centimeters from the anticipated skin incision (tenth intercostal space) to the ventral region just caudal to the thoracic limb. Place the chest tube on a sterile field, and prepare the thorax aseptically.

Author Insight **Maintain sterility while measuring the tube (ie, do not touch the thorax with the tube).**

Step 2

After identifying the tenth intercostal space, place sterile drapes and have an assistant pull the skin of the lateral thorax cranially, starting behind the thoracic limb, until the skin that had been over the tenth intercostal space is over the eighth intercostal space.

Author Insight **Ensure that all assistants wear sterile gloves.**

Step 3

While the assistant continues to pull the skin forward, make a skin incision in the center of the eighth intercostal space, midway between the sternum and spine. Ask the anesthetist to cease assisted ventilation in order to make a stab incision with a #10 blade through the skin incision into the chest cavity.

Step 4

Advance Kelly hemostats into the chest incision for localization, then advance the chest tube (with the trocar in place) cranially into the chest cavity. Once the tube has entered the chest cavity, remove the hemostats. Advance the chest tube (with the trocar still in place) cranially and ventrally into the chest; take care to avoid damaging underlying intrathoracic tissue.

Step 5

When approximately one-third of the tube is within the chest cavity, hold the end of the trocar in place, and advance the tube off the trocar and into the chest until the previously measured centimeter mark on the chest tube reaches the incision. Twist the tube several times to ensure there are no kinks.

Step 6

When the tube is in place, have the assistant release the skin, allowing a SC tunnel to form from the chest wall incision to the skin incision.

Step 7

Place a Christmas tree adapter, connected to a 3-way stopcock, on the end of the chest tube, and use a zip-tie to secure the adapter. Using a large, Luer-tip syringe (35 or 60 mL), evacuate any remaining air or fluid from the pleural cavity. Then secure the chest tube by suturing the skin incision around the tube with a purse-string suture, followed by a finger-trap suture on the chest tube itself.

Author Insight **Once the trocar is removed from the tube, there is a continuous opening from the thoracic cavity to the air. Thus, if the patient is intubated, ventilation must be controlled. If the chest tube had to be placed without first intubating the patient, the tube should be occluded immediately by placing a C-clamp on the tube to avoid additional iatrogenic pneumothorax.**

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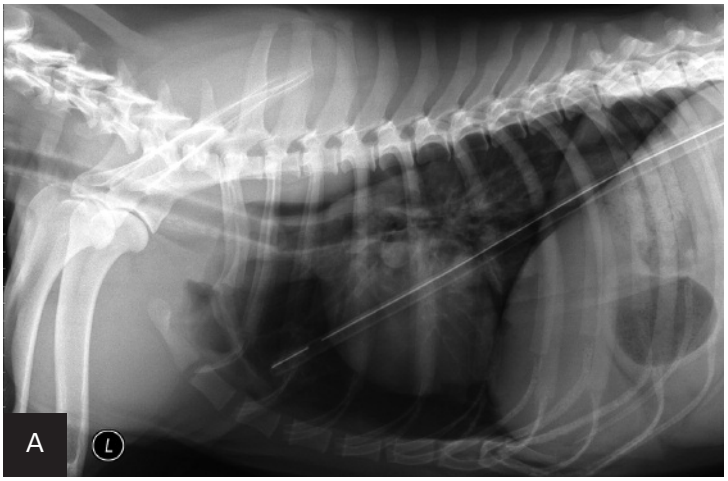
Step 8

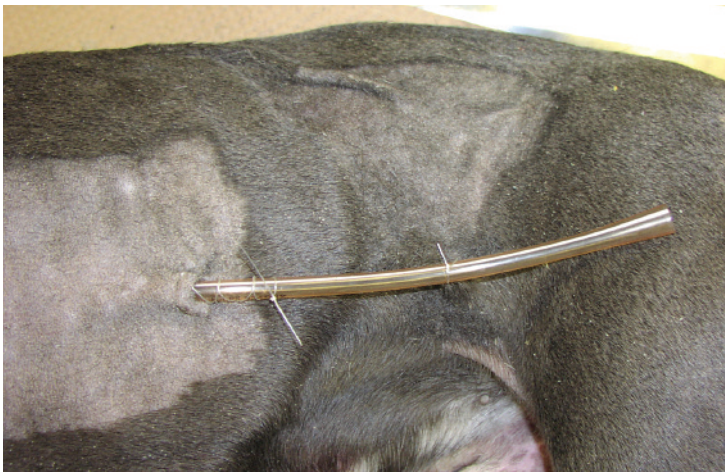
Obtain thoracic radiographs to ensure correct tube placement, which should be directed cranially and ventrally with the tip located at the second to third intercostal space. There should be no bends or kinks in the tube. If necessary, replace the tube and obtain new radiographs to recheck tube placement.



Author Insight **Both lateral (A) and VD (B) views of the thoracic cavity must be taken to verify proper tube placement.**

Step 9

Once correct placement is verified, secure the tube with an anchoring suture. Place this suture in the skin caudal to the chest tube incision by suturing with 2 knots on the skin, then encircling the chest tube and suturing 3 or 4 more knots over the tube. This allows tension to be evenly distributed between the tube and the skin. Cover the insertion site with antibiotic ointment and sterile gauze. Place a light wrap around the thorax to cover the insertion site and help keep the tube from dislodging. ■ cb



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- The "pound method" of placing a thoracostomy tube is no longer recommended, as underlying tissue damage and tube misplacement is more likely to occur.
- The patient should be anesthetized and intubated, if possible, before placing the chest tube for complete control of respirations when the chest is excised.
- Carmalt hemostats should not be used to clamp off the thoracostomy tube once it is placed in the chest cavity. Traumatic damage to the tube may occur, causing air leakage into the chest cavity after placement; an atraumatic C-clamp should be used instead.
- Once the chest tube is removed, the surgical site should be left to heal via second intention, and not sutured closed, as air leakage may occur under the skin for a period of time after the chest tube has been removed.

See **Aids & Resources**, back page, for references & suggested reading.