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The occasional chest tube

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The term "Hobson's choice" refers to situations in which there really is no choice at all; an example is Henry Ford's famous dictum about choosing any colour for a car, providing that the colour is black. Rural physicians not infrequently face a Hobson's choice each time they undertake urgently needed procedures, ones that they rarely perform and for which they have little or no training, because the alternative -- transferring the patient elsewhere -- is impossible. The insertion of a chest tube is one such procedure. This article outlines a simple method for chest drainage that needs no practise for maintenance of competence and that causes little trauma for either the patient or the doctor. The article covers the procedure only, rather than diagnosis and long-term management in such cases. It also assumes that true, significant pneumothorax, hemopneumothorax or pleural effusion is present.

The accompanying illustrations were obtained with the permission and collaboration of the Department of Anatomy, McGill University, Montreal.

Indications

The three most common reasons for chest tube insertion in rural areas are:

- spontaneous pneumothorax greater than 20%
- traumatic pneumothorax, hemothorax or hemopneumothorax
- terminal malignant pleural effusion with dyspnea.

Materials

The following materials are needed:

- dry dressing tray with povidone-iodine for prep
- lidocaine (Xylocaine) 2% without adrenaline in a 5-mL syringe
- 25-gauge, 11Ž2-in. needle for infiltration
- scalpel (any size)
- sterile drapes
- 1-0 silk suture
- chest tube set with needle, syringe, guide wire and dilators*
- drainage system*
- sterile gloves.

*Thal-Quick chest tube sets in various sizes can be ordered from Cook Critical Care (800 465-0547), and Thoraklex chest drainage sets can be ordered from Deknatel Snowden Penca Inc. (800 367-7874).

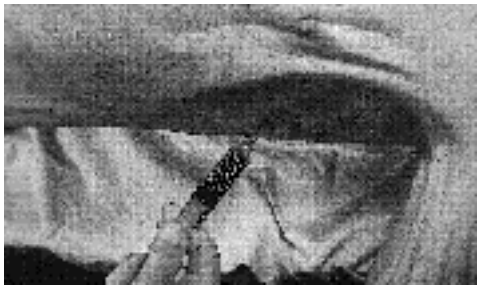
Procedure

The patient should be draped and prepped. The physician should be draped, scrubbed and gloved in a sterile fashion if time permits.

Step 1
Choose a point of entry. The best spot for all indications is the fourth to sixth intercostal space in the midaxillary line. An easy way to find this spot is to measure about one hand's width from the axilla or choose a spot even with the nipple line, although this position will vary according to body type and hand size. The second intercostal space at the midclavicular line can be used for simple pneumothorax but will leave a scar anteriorly.



Step 2
After proper sterile prep and draping, administer extensive local anesthetic, infiltrating down to and then riding over the top of the rib. Avoid the lower edge of the rib where blood vessels are located. Freeze down to the pleura during aspiration. Pleural puncture is not a worry as a tube will be inserted shortly.



Step 3
After freezing, insert the needle provided in the chest tube kit until the pleura is punctured and air, blood or other fluid returns into the syringe. Advance the needle slightly to make sure that the end stays in the cavity. The direction of the needle and the tube is not critical, but for pneumothorax, the needle can be directed anteriorly, if care is taken to avoid the lower edge of the next rib. For pleural effusion or fluid-air collections, direct the needle downward and posteriorly.



Step 4
Unscrew the syringe, then cover the hub with your thumb or ask the patient to stop breathing momentarily. Do not worry if some air sucks into the chest cavity.



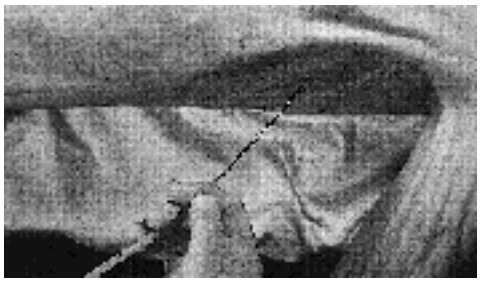
Step 5
Insert the soft J end of the guide wire through the needle into the chest cavity. The guide wire has a plastic hub at the J end to straighten it when it is going through the needle. Some physicians put forceps on the needle close to the skin to prevent the needle from penetrating too deeply into the cavity.



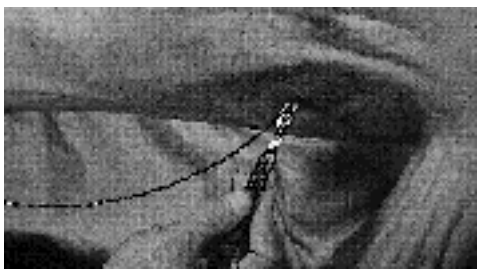
Step 6
Thread the guide wire about 10 cm into the chest cavity or up to the mark on the wire. It should go in without resistance. The J end will resume its shape once free of the needle, preventing injury to the collapsed lung. The wire is quite long, and patient draping could include a sterile gown spread out beside the patient on which the wire can rest uncontaminated.



Step 7
Remove the needle over the wire, taking care not to remove the wire. There will be plenty of slack, so movement of the wire a few centimetres either way is not a worry.



Step 8
Following the wire, infiltrate widely again with Xylocaine around the rib and pleura. Make a skin incision wider than the size of tube you are going to use, with the wire serving as a guide.



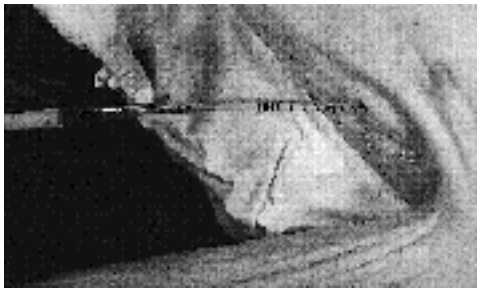
Step 9
Slide the smallest dilator along the wire and insert with a twisting motion into the chest cavity. Again, make sure that the wire itself does not move excessively. Remove the dilator and repeat with the next larger size dilators until all have been used, except for the last one, which carries the chest tube.



Step 10
Slide the last dilator with the chest tube over the wire and into the chest cavity until all the holes of the tube are well within the chest cavity.



Step 11
Remove the dilator, leaving the patent tube in place, and connect the tube to the drainage system.



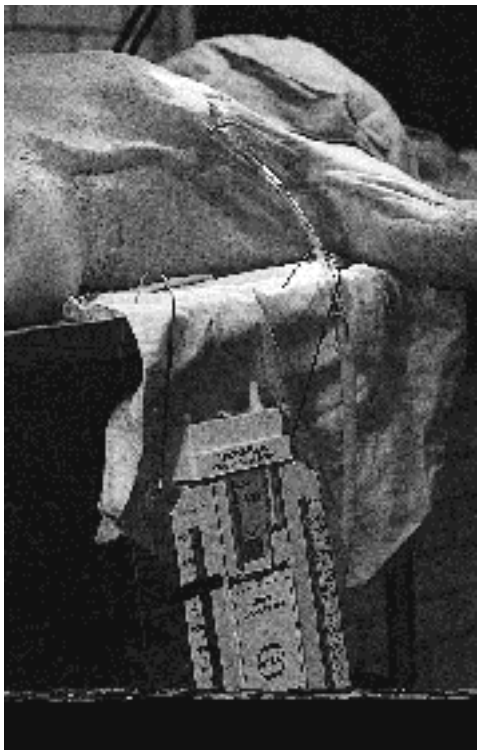
Step 12
Suture the tube in place. Some physicians use a purse-string suture to help in closing the incision when the tube is removed.



Step 13
Take several layers of 4 x 4 cm Vaseline gauze (such as Adaptic or Jelonet), make a cut with scissors to the centre, place around the tube, follow with several layers of 4 x 4 cm plain gauze and tape with waterproof tape, incorporating some of the tape around the tube.



Step 14
Begin drainage. We use a self-contained drainage system, which is easy to use and is attached to standard wall suction, but any system -- twin bottles, Heimlich valves or a simple rubber glove with a slit opened on the end -- will do.



When a lung re-expands there is some pleural pain, which can be treated with analgesics or intramuscular or intravenous narcotics. Very rapid re-expansion can cause unilateral pulmonary edema, but this complication is rare and usually does not require treatment. If the tube is placed too far into the cavity, the pleural pain it causes can be relieved by withdrawing the tube a few centimetres. When draining large amounts of pleural fluid or blood, temporarily clamp the tube, if possible, after the first litre to minimize large fluid shifts. For simple pneumothorax, use a 24 French tube and for hemothorax a 32 French tube. For malignant effusion or when the patient is a child, an 18 French tube or smaller is sufficient.

Conclusion

This method is very easy and atraumatic. There should be no accident victim imperilled by a lack of chest drainage, no patient with spontaneous pneumothorax transported in pain and dyspnea, no patient with terminal cancer dying in dyspnea from a large effusion and no fear of a Hobson's choice in chest tube insertion for the rural doctor.

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