

LESSON ASSIGNMENT

LESSON 3

Emergency Surgical Procedures.

LESSON ASSIGNMENT

Paragraphs 3-1 through 3-6.

LESSON OBJECTIVES

After completing this lesson, you should be able to:

- 3-1. Identify the steps in the procedure of a venous cut-down.
- 3-2. Identify the steps in the procedure of needle decompression.
- 3-3. Identify the steps in the procedure of insertion of a chest tube.
- 3-4. Identify the steps in the procedure of a surgical cricothyrotomy.

SUGGESTION

After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 3

EMERGENCY SURGICAL PROCEDURES

3-1. INTRODUCTION

The following emergency surgical procedures are presented as an overview for the treatments of the leading causes of preventable death on the battlefield. These causes--hemorrhage, tension pneumothorax, and airway compromise--are all treatable. This overview should be used as a reminder of the steps to conduct these procedures and not be considered comprehensive training in these areas.

3-2. VENOUS CUT-DOWN PROCEDURE

Several conditions indicate a need for venous cut-down. Use the procedure when it is impossible or hazardous to locate a vein large enough for a needle to pierce unbroken skin; for example, when normally accessible veins are collapsed because of volume depletion or peripheral vasoconstriction and all other means have been exhausted. The venous cut-down procedure is a last resort, it should be attempted after you have had unsuccessful peripheral IV attempts and have tried intra-osseous without success or you do not have intra-osseous capability. Even under these circumstances, the cut-down is a controversial but necessary procedure.

a. **Anatomical Considerations.** There are two good sites for a venous cut-down procedure: the primary site and the secondary site.

(1) Primary site. The primary site is the greater saphenous vein at the ankle (figure 3-1A). This vein is located at a point approximately two centimeters anterior and medial from the medial malleolus.

(2) Secondary site. A secondary site is the antecubital median basilic vein (figure 3-1B). This vein is located two and a half centimeters lateral to the medial epicondyle of the humerus of the flexion crease of the elbow.

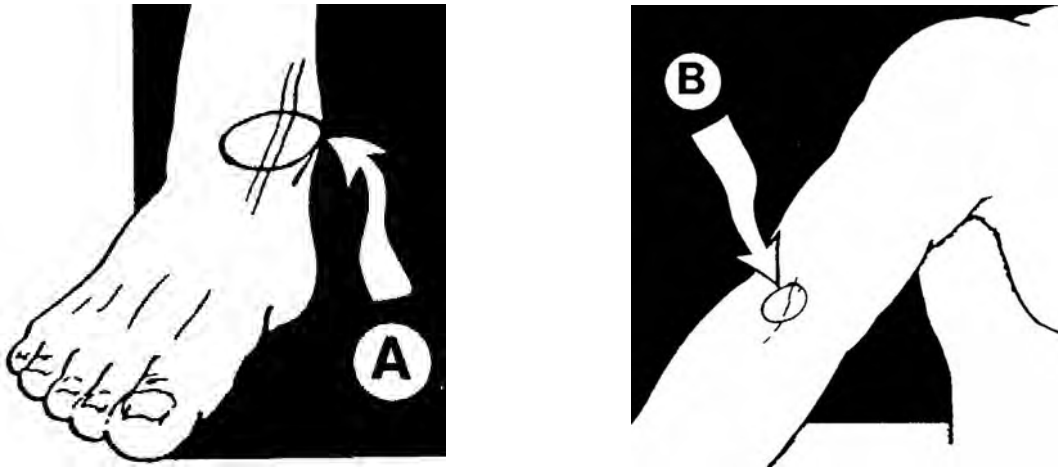


Figure 3-1. Venous cut-down sites.

A. Greater saphenous vein at the ankle.

B. Antecubital median basilic vein in the upper arm.

b. **Venous Cut-down Procedure.** Follow these steps.

- (1) Prepare the skin with Betadine[®] and drape the patient.
- (2) Infiltrate the skin over the vein with a local anesthetic. A 0.5 percent solution of lidocaine is recommended.
- (3) Make a full-thickness transverse skin incision through the area of anesthesia. Make the incision two and a half centimeters long.
- (4) Identify the saphenous vein. Using a curved hemostat, free this vein from the sphenous nerve by blunt dissection. The saphenous nerve is attached to the anterior wall of the saphenous vein.
- (5) Elevate and dissect the nerve to free the vein from its bed for a distance of approximately two centimeters (figure 3-2).

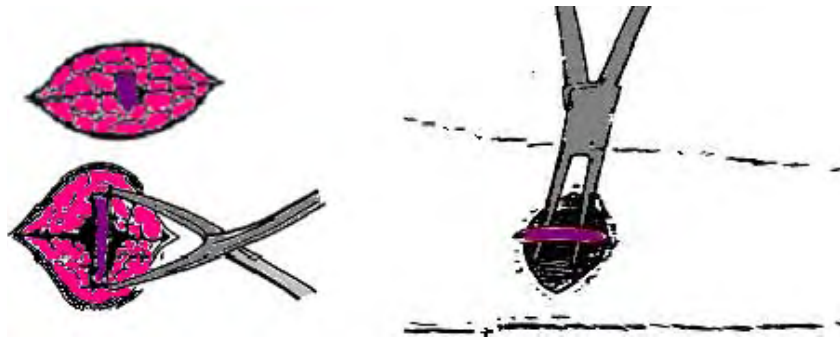


Figure 3-2. Blunt dissection.

(6) Tie off the vein distally, using a piece of suture material. Leave the suture in place for traction (figure 3-3).

(7) Pass a tie about the vein, proximally (figure 3-3).

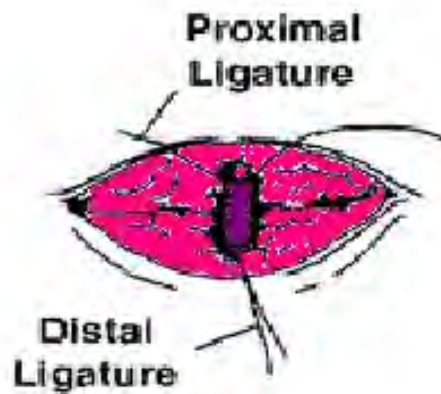


Figure 3-3. Tying the vein.

(8) Canulate the vein directly as in a regular IV, keeping in mind that you only have to penetrate the vein and not the skin. An alternate method is to make a small transverse cut in the vein and gently dilate the opening with the tip of a closed hemostat.

(9) Introduce a plastic cannula through the opening with the tip of the catheter towards the heart. Secure the cannula in place by tying the upper ligature above the vein and cannula. Be sure to insert the cannula an adequate distance to prevent its coming out.

(10) Attach the IV tubing to the cannula and close the incision with interrupted sutures.

(11) Apply antibiotic ointment to the puncture site.

(12) Apply a dry, sterile dressing.

c. **Possible Complications.** There may be some complications from the venous cut-down and/or the insertion of a cannula. Some possible complications are listed below.

(1) Cellulitis--a diffuse spreading infection, especially of the subcutaneous tissues.

(2) Hematoma--a localized mass of blood outside of the blood vessels. Such blood is usually found in a partly clotted state.

- (3) Phlebitis--inflammation of a vein.
- (4) Perforation of the posterior wall of a vein--a back wall of a vein is pierced.
- (5) Venous thrombosis--a blood clot in a vein.
- (6) Nerve transections--cutting across a nerve.
- (7) Arterial transection--cutting across an artery.

NOTE: Fewer complications occur when aseptic technique is used and proper care is taken when the cannula is placed.

3-3. NEEDLE DECOMPRESSION (THORACENTESIS)

Needle decompression is the removal of air and fluid from the chest cavity by puncture.

a. **Indications for Needle Decompression.** Indications for needle depression include the following.

(1) Under combat conditions, if a casualty has unilateral chest trauma and an increase in respiratory effort, these are the only conditions needed to indicate the need for immediate chest needle decompression.

(2) Under more controlled conditions, the following signs and symptoms should be observed prior to chest needle decompression.

- (a) Severe respiratory distress.
- (b) Jugular vein distention.
- (c) Hyper resonance on the affected side.
- (d) Absent or diminished breath sounds on the affected side.
- (e) Pulseless paradox (the radial pulse fades or disappears upon inspiration).
- (f) Tracheal deviation may be seen, but is considered a very late and grave sign.

b. **Procedure for Needle Decompression.** Follow this procedure.

- (1) Confirm the diagnostic need for the needle decompression procedure.
- (2) Obtain a 14 gauge 3 to 3.5-inch needle.
- (3) If available, give the patient supplemental oxygen. This is normal procedure for a patient in respiratory distress.

NOTE: Always provide the optimum condition the situation allows

- (4) Identify your site (figure 3-4). The primary site is the second intercostal space in the midclavicular line. You can alternately use the third through sixth intercostal space moving toward the anterior axillary line, making sure to stay clear of the major organs, especially on the left side of the chest.

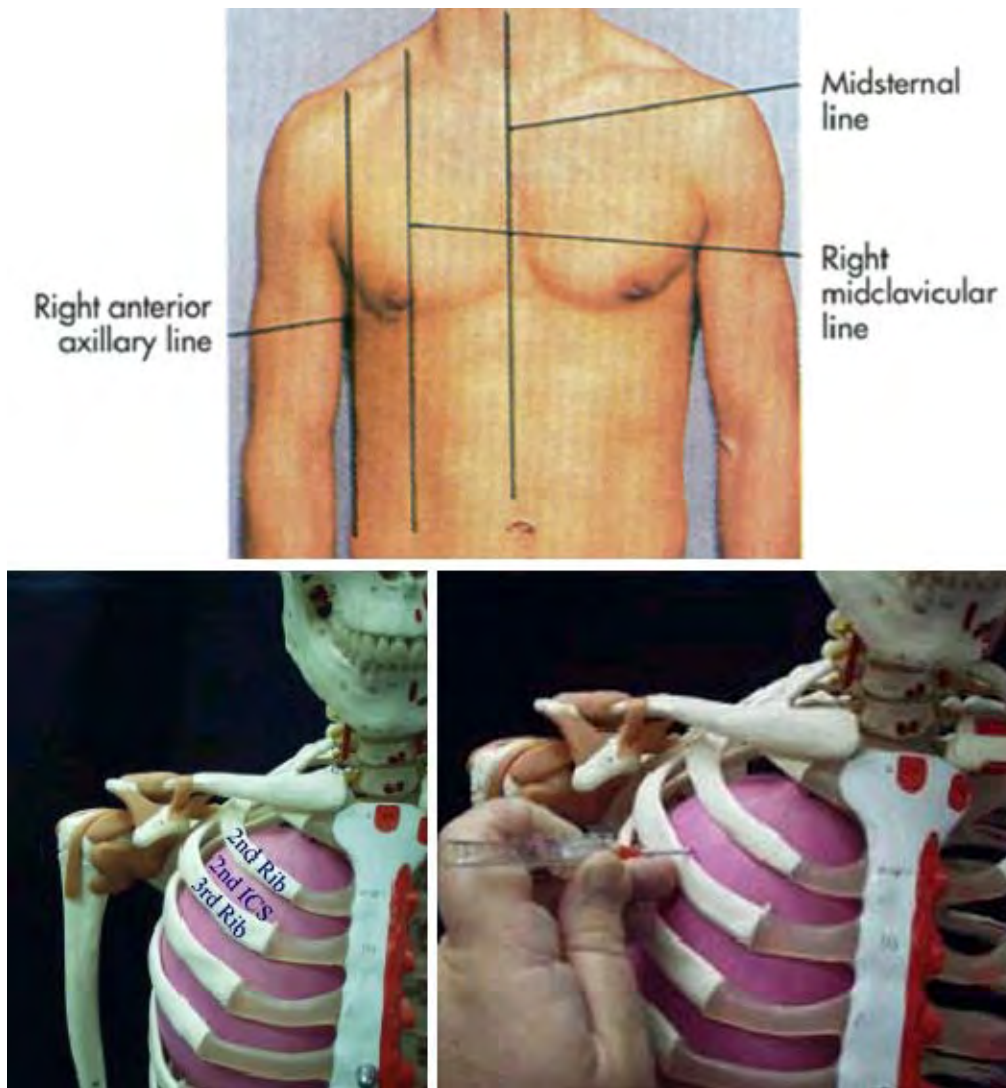


Figure 3-4. Sites for needle decompression.

(5) Anesthetize the area locally if time permits. Remember, this is a life-saving emergency procedure. The patient's airway is compromised and the chest needle decompression is the fix. Do not waste time getting the airway open.

(6) Position the patient. You may position him in an upright position if you have determined that he does not have a cervical spine fracture.

(7) Insert the thoracentesis needle into the skin. Direct the needle just over the rib into the intercostal space.

(8) Puncture the parietal pleural space.

(9) Aspirate as much air as necessary to relieve the patient's acute symptoms.

(10) Leave the plastic catheter in place and apply a bandage or a small dressing.

3-4. CHEST TUBE INSERTION

Chest tubes are placed so that air and blood can be removed from the intrathoracic cavity. Place the chest tube in the appropriate space so that air is removed and the condition is relieved. Chest tubes are placed so that gravity aids suction in fluid removal.

a. **Indications for Chest Tube Insertion.** Three conditions commonly require the insertion of a tube into the chest. The conditions are hemothorax, pneumothorax, and tension pneumothorax. Hemothorax is the accumulation of blood in the pleural cavity. Pneumothorax is the accumulation of air in the pleural space. The amount of trapped air or gas determines the degree of lung collapse. In tension pneumothorax, air in the pleural space is under higher pressure than air in the adjacent lung and the vascular structures. A patient with tension pneumothorax must have prompt treatment or he will suffer fatal pulmonary and circulatory impairment.

b. **Equipment for Chest Tube Insertion.** Equipment needed includes the following:

(1) Betadine[®] or another solution in preparing the site for chest tube insertion.

(2) Sponges for preparation of the site.

(3) 2 large, curved, Kelly clamps.

(4) 6 x 10 millimeter syringes with number 18 and number 25 gauge needles.

- (5) Scalpel and blade.
- (6) One percent lidocaine.
- (7) Suture (to secure the chest tube).
- (8) Suture (for wound approximation).
- (9) Appropriate chest tube size.
- (10) Chest drainage collection device.
- (11) Sterile surgical gloves.
- (12) Occlusive dressing material.
- (13) Sterile drape.
- (14) Needle holder.
- (15) Tape.

c. **Procedure for Chest Tube Insertion.** Monitor the patient throughout the procedure. Perform the following steps.

- (1) Put on the gloves and mask.
- (2) The site is about nipple level (the fifth or sixth intercostal space) on his affected side on the mid to anterior axillary plane. See figure 3-5.
- (3) Prepare and drape the patient.
- (4) Locally, anesthetize the skin and rib periosteum if the patient's condition and time permit.
- (5) Incise the skin, creating a tunnel. Using a scalpel and blade, make a two to three centimeter transverse incision through the subcutaneous tissues, just over the top of the rib. Create a tunnel by spreading the clamp.
- (6) Using the clamp, make a hole into the pleural space. Grip the clamp along its shaft to prevent plunging too deeply into the chest. Make the hole at the top edge of the patient's rib. Spread the clamp to enlarge the hole and remove the clamp.

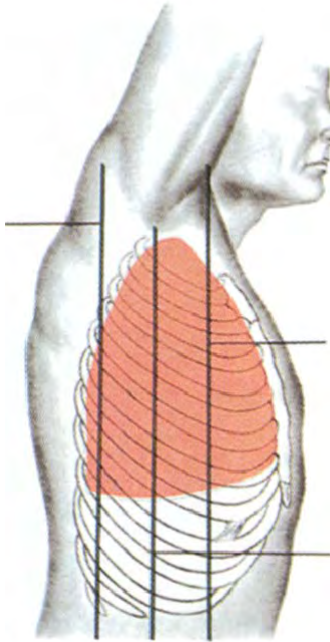


Figure 3-5. Landmarks for chest tube insertion.

(7) Explore the pleural space. With the sterile gloved index finger of your dominant hand, explore the intrathoracic area to confirm that it is free of adhesions or clots. Be careful to guard against extrapleural tube placement.

(8) Insert the chest tube in the following manner.

(a) Grasp the chest tube with the clamp. Bevel the end of the chest tube with scissors to facilitate the passage of the tube through the chest wall. Remove any sharp edges.

(b) Guide the chest tube into the pleural space.

(c) Advance the tube to the apex, leaving no holes external to the pleural space.

(9) Look for fogging of the chest tube when the patient breathes out, an indication of a properly placed tube.

(10) Quickly attach the chest tube to an underwater seal apparatus.

NOTE: If a drainage system is not available, improvise with a Heimlich valve (figure 3-6).

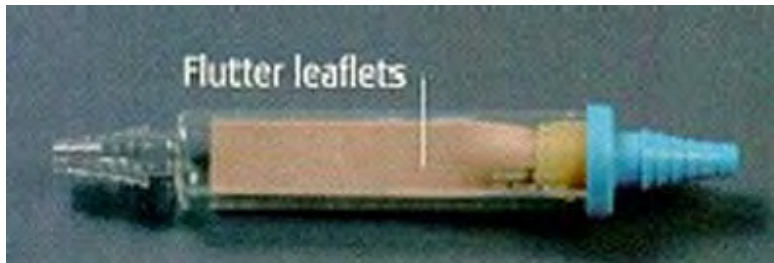


Figure 3-6. Heimlich valve.

(11) When the tube is properly placed, secure it with a suture attached to the skin. Leave one suture long and tie that suture securely around the chest tube. See figure 3-7.

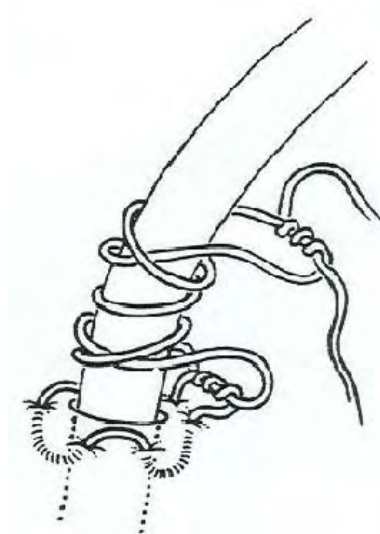


Figure 3-7. Pursestring suture and sandal tie.

(12) Apply the dressing. Follow this procedure.

- (a) Apply tincture of benzoin to the skin.
- (b) Place petroleum gauze around the tube exit site to make an airtight seal.
- (c) Cover the gauze with a dry, sterile dressing.
- (d) Secure the test tube with adhesive tape.

(13) When it is possible, obtain a chest x-ray to be sure the chest tube has been placed properly.

3-5. SURGICAL AIRWAY

a. **General.** The primary indication to create a surgical airway is the need for an airway for a patient who cannot be intubated. Cricothyrotomy, creation of a surgical airway, is the incision through the skin and cricothyroid membrane to secure a patient airway for emergency relief of upper airway obstruction. The word cricothyroidotomy is another name for this surgery. The two types of cricothyrotomy are needle cricothyrotomy and surgical cricothyrotomy. The needle cricothyrotomy method is preferable in an emergency situation for a child under 12 years of age, but is still very temporary.

b. **Procedure for Surgical Cricothyrotomy.** Follow this procedure.

- (1) Identify the cricothyroid membrane. Do this in the same way as for needle cricothyrotomy.
- (2) Prepare the skin over the membrane with povidone-iodine.
- (3) Puncture the cricothyroid membrane in this manner:
 - (a) Make a vertical skin incision over the lower one-half of the cricothyroid membrane.
 - (b) Carefully incise through the membrane.
 - (c) Insert the scalpel handle into the incision and rotate 90 degrees to open the airway.
- (4) Insert the cannula or ET tube.
 - (a) Keep your left hand on the larynx to stabilize the larynx.
 - (b) Pick up the cannula in your dominant hand. Place the cannula through the puncture hole, with the cannula tip pointing toward the patient's feet.
 - (c) Using controlled force, insert the cannula and advance it until the flange is flush with the skin.
 - (d) If you are using a cuffed tracheostomy tube, inflate the cuff.
- (5) Check for correct placement.
 - (a) Listen and feel for air flow through the cannula.
 - (b) Ventilate through the cannula. The patient's chest should rise and fall with each ventilation. The patient's breath sounds should be audible on both sides of his chest.

(6) Secure the cannula with tape.

NOTE: Due to its potential hazards, cricothyrotomy should be performed **ONLY** by personnel who have been thoroughly trained in this method and who have been approved by their physician directors to use this method.

3-6. CLOSING

Trauma strikes all ages. Generally, trauma is swift in onset and slow in recovery, with many problems along the way for those trying to manage its course. Trauma can have a devastating effect on the members of our society. Prevention is paramount. Where prevention fails, we must be knowledgeable and prepared to meet the patient's immediate needs.

[Continue with Exercises](#)

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EXERCISES, LESSON 3

INSTRUCTIONS. The following exercises are to be answered by writing the answer in the space provided or by matching terms as directed. After you have completed all the exercises, turn to "Solutions to Exercises, Lesson 3" at the end of the exercises and check your answers.

1. A venous cut-down procedure is being performed. The primary site for this procedure is _____, which is located at the _____.
2. The secondary site for a venous cut-down procedure is the _____, located close to the _____.
3. List three possible complications of a venous cut-down.
 - a. _____.
 - b. _____.
 - c. _____.
4. Needle decompression is _____.
5. List three indications that needle decompression should be performed under controlled conditions.
 - a. _____.
 - b. _____.
 - c. _____.

6. List three indications that the patient needs a chest tube insertion.

a. _____.

b. _____.

c. _____.

7. What is the primary indication for creating a surgical airway?

8. The two qualifications a 68W Medical NCO must have to perform a surgical cricothyrotomy are:

a. _____.

b. _____.

9. To insert the cannula properly when you are performing a surgical cricothyrotomy, you should:

a. Keep your left hand on the _____ to stabilize it.

b. Pick up the cannula in your _____ hand.

c. Place the cannula through the puncture hole, with the cannula tip pointing toward the patient's _____.

d. Using controlled force, advance the cannula until the _____ is flush with the skin.

e. If you are using a cuffed tracheostomy tube, _____ the cuff.

10. To check for correct placement of the cannula in a patient who has had a surgical cricothyrotomy, you should:

a. _____.

b. _____.

11. Listed below are the major steps in the procedure of inserting a chest tube. Place the steps in the order in which they would be performed.

- a. _____ S. Apply a dressing.
- b. _____ T. Explore the pleural space.
- c. _____ U. Suture the skin, securing the chest tube.
- d. _____ V. Insert the chest tube.
- e. _____ W. Locally, anesthetize the skin and periosteum if there is time.
- f. _____ X. Prep and drape the patient.
- g. _____ Y. Perforate into the pleural space.
- h. _____ Z. Incise the skin and create a tunnel.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 3

1. The greater saphenous vein; ankle. (para 3-2a(1))
2. The antecubital median basilic vein; elbow. (para 3-2a(2))
3. You are correct if you listed any three of the following:
 - Cellulitis.
 - Hematoma.
 - Phlebitis.
 - Perforation of the posterior wall of the vein.
 - Venous thrombosis.
 - Nerve transection.
 - Arterial transection. (para 3-2c(1) through (7))
4. Needle decompression is the removal of air and fluid from the chest cavity by puncture.
(para 3-3)
5. You are correct if you listed any three of the following:
 - Severe respiratory distress.
 - Jugular vein distention.
 - Hyper resonance on the affected side.
 - Absent or diminished breath sounds on the affected side.
 - Pulseless paradox (the radial pulse fades or disappears upon inspiration).
 - Tracheal deviation may be seen but is considered a very late and grave sign.
(para 3-3a(2)(a)-(f))
6. The patient has hemothorax.
The patient has pneumothorax.
The patient has tension pneumothorax. (para 3-4a)
7. The primary indication to create a surgical airway is the need for an airway for a patient who cannot be intubated. (para 3-6a)
8. Thoroughly trained in the procedure.
Approved by the physician directors to perform a cricothyrotomy.
(para 3-5b, NOTE)
9.
 - a. Larynx.
 - b. Dominant.
 - c. Feet.
 - d. Flange.
 - e. Inflate. (para 3-5(b)(4)(a)-(e))
10.
 - a. Listen and feel for air flow through the cannula
 - b. His chest rises and falls with each ventilation. (para 3-5b(5)(a), (b))

11. a. X
b. W
c. Z
d. Y
e. T
f. V
g. U
h. S (para 3-4c(3)-(12))

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