

- Immobilize the elbow with a sling and swathe or with a padded long arm splint. Full extension or flexion of less than 90° should be avoided to decrease the chances of vascular complications.

c. Phalanges.

- Both metacarpal-phalangeal and interphalangeal joint dislocations are identified by obvious deformity of joints and painful movement. Dislocations of the metacarpal-phalangeal and interphalangeal joints are managed by splinting in a position of function.

- Stabilize the fracture and/or dislocation to an adjacent toe or finger with tape, with padding between the toes or fingers. Traction applied proximally and distally to the involved joint relaxes the muscular spasm, allowing movement of the articular surfaces into their normal position.

d. Ankle.

- Dislocations of the ankle are frequently associated with fractures. Generally, there is gross deformity of the ankle and often it is not possible to distinguish a fracture from a dislocation.

- Treat an ankle dislocation as if it were a fracture—immobilize the ankle with a splint.

Section VI. BANDAGES AND BINDERS

13-38. General

a. Bandages and binders are used to—

- Apply pressure to control bleeding.
- Provide for immobilization of an injured body part, such as a fractured arm.
- Hold dressings in place.
- Protect open wounds from contaminants.
- Provide support and aid in venous blood return, such as when bandaging the leg of a patient suffering from impaired circulation.

b. Bandages and binders are applied so that pressure is evenly distributed to the affected area. If a joint is involved in bandaging, it is supported in its normal position with a slight flexion of the joint. Both the bandage and binder are wrapped securely to avoid friction or rubbing of the underlying tissue, which can cause severe irritation. It must be tight enough to stay in place but not so tight as to cut off circulation.

c. Signs of impaired circulation are paleness or cyanosis, swelling, coolness, and pain. Leave the tips of the fingers and toes visible on a bandaged extremity so that you can check for circulation.

d. When possible, elevate the extremity for 15 minutes before applying a bandage. This aids venous blood flow and reduces swelling in the hand or foot. If the extremity is wrapped while swollen, the bandage will become loose and slip when the edema subsides. Elevate the extremity by having the patient lie with the arm or leg resting on a supporting object above the level of the heart.

e. A bandage or binder is applied over a clean, dry area as a precaution against microorganisms which grow in warm, damp areas. Be sure that skin surfaces are not bandaged in contact with each other—they will sweat and provide a moist environment in which microorganisms can grow. Always pad (4 x 4 or ABD bandage) adjoining skin surfaces before bandaging or binding. Also, pad all bony prominences before bandaging to avoid pressure, which can lead to skin irritation. If left unattended for several days, such an irritation can become a decubitus ulcer (pressure sore). A bandage or binder applied to a draining wound must be changed frequently to keep it as clean and dry as possible. Discard all soiled bandages and binders.

13-39. Types of Bandages

a. There are several types of bandages available for use today (Figure 13-51). The type and width you select will depend upon the purpose of the bandage. The gauze roller bandage is used less frequently for bandaging the arm or leg because there is a difference in the size of the extremity. Other bandages that have more elastic or clinging ability provide a firmer wrapping that stays in place and provides better support.

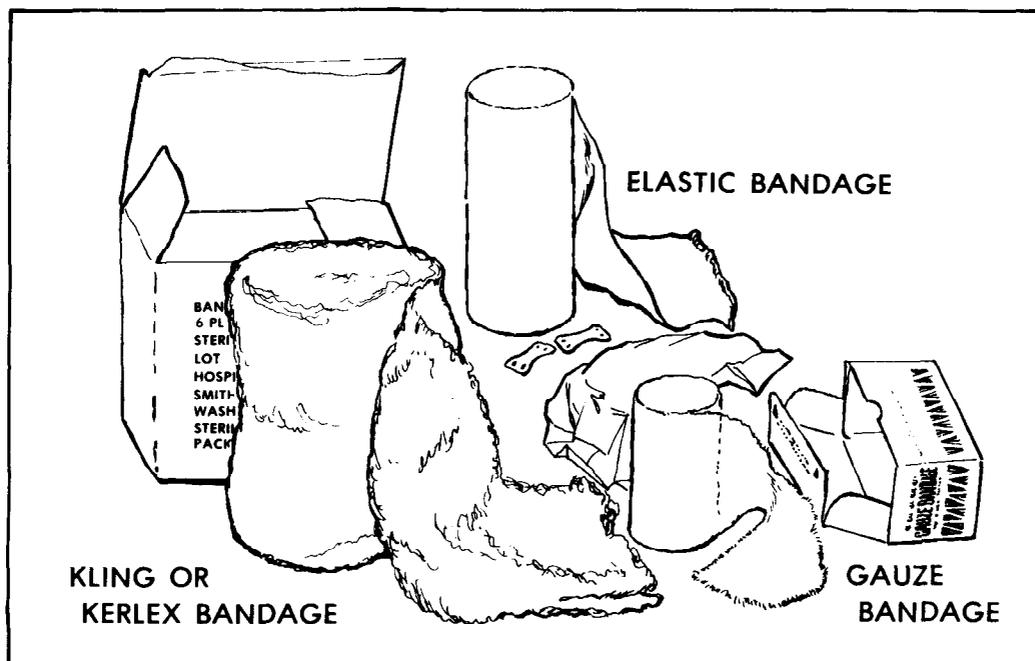


Figure 13-51. Types of bandages.

b. Elastic bandages are made of woven material that can be stretched and molded around the body part being bandaged. The Ace bandage and stockinette are two types of elastic material. These bandages can be removed, rewound, and used again for the same patient. Do not reuse for a different patient, or when a sterile bandage is required.

c. The cling bandage stretches but is not elastic. It molds around irregular and hard to bandage areas and is often used for holding dressings in place on the head, or on the stump of an amputated extremity. The clinging bandage may then be covered with an elastic bandage for firm support.

d. Approximate lengths and widths needed for bandaging body parts are:

<i>Body Part</i>	<i>Length</i>	<i>Width</i>
Head	6 yards	2 inch
Trunk	10 yards	3 to 6 inch
Leg	9 yards	2 to 4 inch
Foot	4 yards	1 ½ to 3 inch
Arm	7 to 9 yards	2 to 3 inch
Hand	3 yards	1 to 2 inch
Finger	1 to 3 yards	½ to 1 inch

13-40. Apply a Circular Bandage to an Arm

- a. Wash your hands.
- b. Place the patient in a comfortable position.
- c. Remove the used bandage and wash the area that was bandaged (if needed).
- d. Unroll the bandage and anchor it in place.

● Ask the patient to raise the injured arm slightly (about 6 to 12 inches) so that you can wrap it. If the patient is unable to lift the arm, you may need assistance.

● Unwind the bandage toward the right around the patient's arm. Hold the roll of bandage in your right hand so that it unwinds from the bottom (reverse hand positions and direction of wrap if you are left-handed). With moderate tension, hold the bandage in place with your left thumb. If you hold the bandage too loosely while wrapping, it will come off easily. If the bandage is wrapped too tightly, it will cut off the patient's circulation.

e. Make two initial circular turns to secure the bandage in place. Secure the free end of the bandage to the arm directly below the injury site. For the patient's comfort, the beginning (initial) and terminal end of the bandage are not to be placed directly over the wound, a bony prominence, the inner aspect of a limb, or a part that the patient will lie on.

f. Each circular turn should overlap one half the bandage width of the preceding turn. Each successive turn anchors (holds in place) the underlying layer of bandage. Use as much bandage as is needed to hold the dressing in place or to immobilize the part.

g. Secure the terminal end of the bandage (Figure 13-52). Use tape, metal clips, safety pins, or a knot.

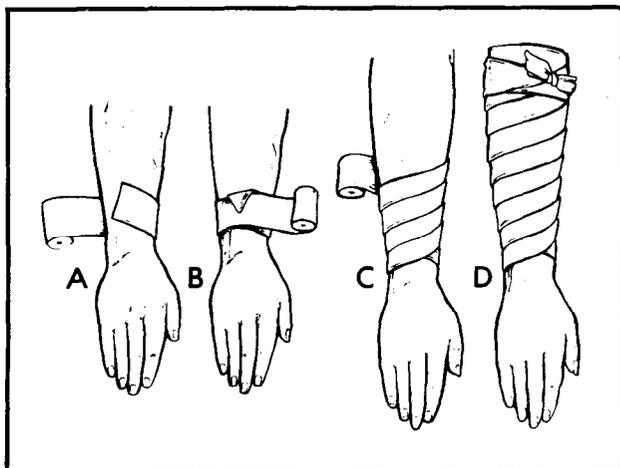


Figure 13-52. The circular bandage in place.

13-41. Apply a Figure-of-8 Bandage to an Ankle

The figure-of-8 bandage may be used by itself or with a circular, spiral, or spiral reverse bandage when a joint is included in the wrapping. The figure-of-8 bandage around the joint protects, supports, and limits the movement of the joint and promotes the venous blood return which reduces swelling or edema. The advantage of the figure-of-8 bandage is that it can support the joint in a position of flexion, or allow limited movement when necessary.

a. Anchor the bandage over the foot (Figure 13-53A). Place the initial anchoring turns around the foot, beginning near the toes.

b. Make a circular turn over the foot and around the ankle (Figure 13-53A).

- For support place the first turn at the upper part of the ankle. Place each successive turn lower over the ankle and heel.

OR

- For promoting venous blood return, place the first turn lower on the heel. Place each successive overlapping turn higher onto the ankle.

c. Continue the wrap by making a spiral turn down over the ankle and around the foot (Figure 13-53B).

d. Alternate the upward and downward spiral turns about the joint (Figure 13-53B). Overlap each layer with one half the bandage width. Make at least three complete turns. Continue bandaging the lower leg, if necessary.

e. Secure the end of the bandage (Figure 13-53D).

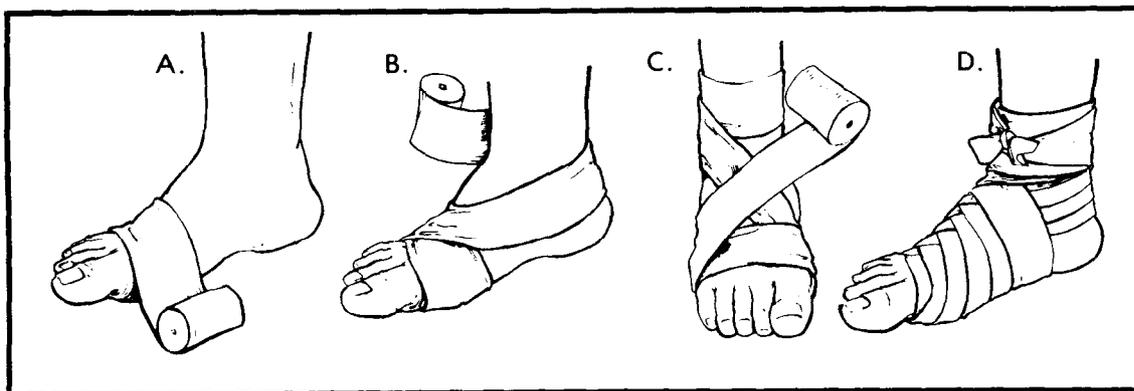


Figure 13-53. Figure-of-8 bandage applied to an ankle.

13-42. Apply a Figure-of-8 Bandage to a Hand

- a. Anchor the bandage over the fingers (Figure 13-54A).
- b. Make a circular turn over the hand and around the wrist (Figure 13-54B).
- c. Continue the wrap by making a spiral turn down over the wrist and around the hand.
- d. Alternate the spiral turns about the joint (Figure 13-54C). Overlap each layer with one half the bandage width. Make at least three complete turns.
- e. Secure the end of the bandage (Figure 13-54D).

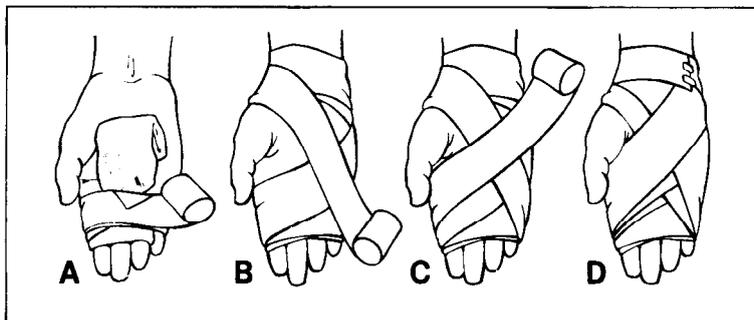


Figure 13-54. Applying a figure-of-8 bandage to a hand.

13-43. Apply a Figure-of-8 Bandage to a Forearm

- a. Anchor the bandage over the wrist (Figure 13-55A).
- b. Make a spiral turn over the length of the forearm and around the upper forearm just below the elbow (Figure 13-55B).
- c. Make two anchor wraps around the upper forearm just below the elbow (Figure 13-55C).
- d. Make a spiral turn between the wrist and upper forearm (Figure 13-55D).
- e. Alternate the spiral turns between the wrist and upper forearm until a complete cover is provided for the forearm (Figure 13-55E).
- f. Secure the end of the bandage (Figure 13-55F).

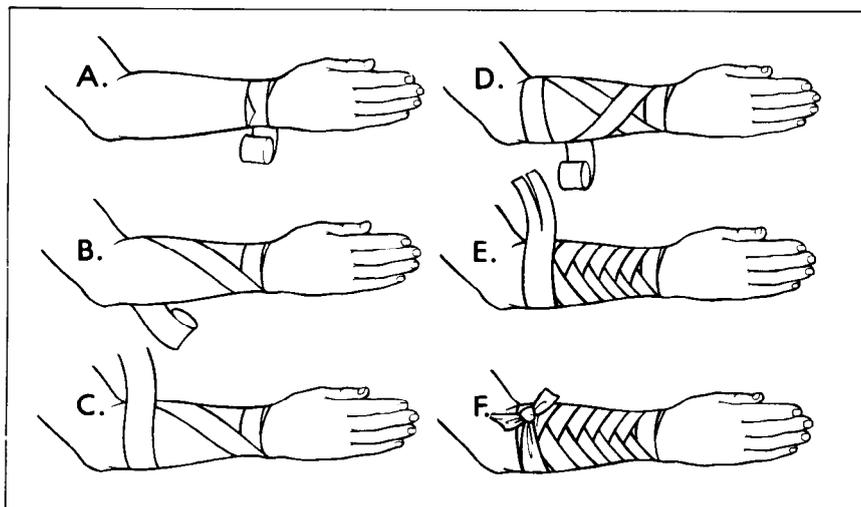


Figure 13-55. Applying a figure-of-8 bandage to forearm.

13-44. Apply a Figure-of-8 Bandage to a Knee

- a. Anchor the bandage over the mid-calf of the leg (Figure 13-56A).
- b. Make a circular turn over the knee and around the lower thigh (Figure 13-56B).
- c. Continue the wrap by making a spiral turn down under the knee and around the calf of the leg (Figure 13-56C).
- d. Alternate the spiral turns about the joint until a complete cover is provided for the knee (Figure 13-56D).
- e. Secure the end of the bandage (Figure 13-56D).

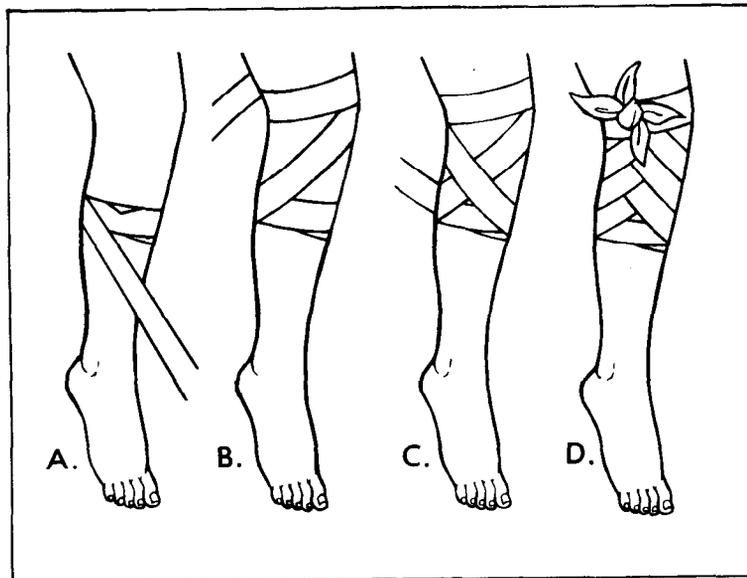


Figure 13-56. Applying a figure-of-8 bandage to a knee.

13-45. Apply a Spiral Bandage to a Leg

This procedure is used to apply an elastic bandage to an arm or leg. When the leg is involved, an elastic stocking may be used instead of the bandage. Read the directions on the package before applying. Frequently observe the circulation in the fingers or toes after application.

- a. Begin by anchoring the bandage with two circular turns (Figure 13-57A). Often, you will need to bandage the foot to aid venous blood return before you apply a bandage to the leg. Use the figure-of-8 bandage on the foot and then proceed with the spiral wrapping of the leg, if necessary.

b. With each succeeding turn of the bandage, angle slightly upward around the leg (Figure 13-57B). The direction is upward and around, downward and around, like a spiral staircase, in the same direction as the blood flow returning to the heart. Each turn is parallel to the preceding turn and overlaps about one half the width of the bandage.

c. Wrap the bandage evenly and smoothly (Figure 13-57C). Hold the extremity firmly and wrap it securely. Do not wrap it so tightly that you cut off the circulation. As you wrap, ask the patient how it feels. Loosen it immediately if it is too tight.

d. Continue wrapping in the spiral fashion (Figure 13-57D). Wrap until the part is completely covered.

e. Secure the end of the bandage (Figure 13-57D). Use tape, clips, safety pins, or a knot. As before, do not start or finish the bandage over wounds or bony prominences.

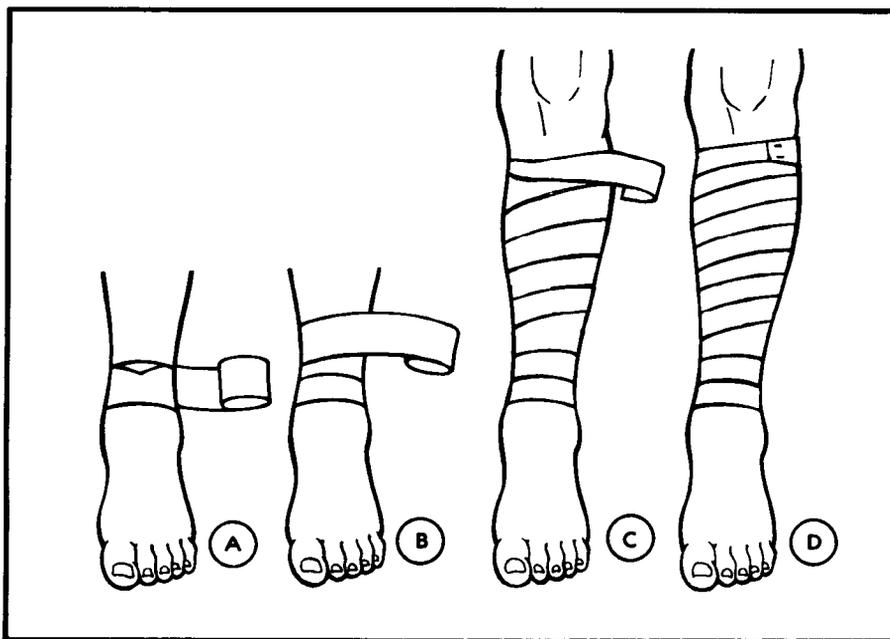


Figure 13-57. Applying a spiral bandage to a leg.

13-46. Apply a Spiral Bandage to a Forearm

a. Anchor the bandage with two circular turns.

b. With each succeeding turn of the bandage, angle slightly upward around the forearm. Overlap the preceding turn about one half the width of the bandage.

c. Wrap the bandage evenly and smoothly. Do not wrap the bandage too tightly; you may cut off circulation.

d. Continue wrapping in a spiral method until the forearm is completely covered.

e. Secure the end of the bandage.

13-47. The Spiral Reverse Bandage

This bandage is used to wrap an extremity that has varying thicknesses (such as the ankle which rises to a thicker area—the calf of the leg). This method of bandaging provides a means to make a secure, smooth, even-fitting bandage on an extremity.

a. Anchor the bandage with two complete turns (Figure 13-58A and 13-58B).

b. Make a spiral reverse turn (Figure 13-58C).

- Place your thumb on the upper edge of an anterior turn and hold firmly.

- Turn the bandage downward over the thumb and toward the lower edge of the previous turn.

- Cover about one half of the previous lap and continue the turn.

c. Continue making spiral reverse turns (Figure 13-58D). Wind the bandage in the same manner and place it as the previous layers. The spiral reverse bandage fits the contours of the extremity.

d. Secure the end of the bandage (Figure 13-58D).

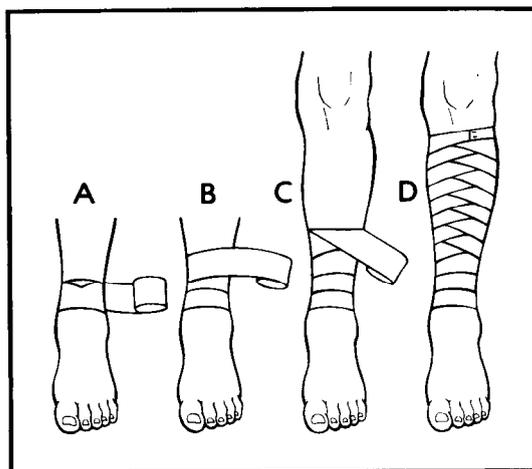


Figure 13-58. The spiral reverse bandage.

13-48. Apply a Recurrent Bandage

The recurrent bandage is applied to hold pressure dressings in place over the tip end of a finger, toe, fist, or stump of an amputated extremity, and on the head. Supplies needed consist of a bandage (elastic, cling, or roller type; width depends on site: 1 inch wide for finger, 3, 4, or 6 inches wide for stump or head).

a. Unroll the bandage and secure the end with two complete turns around the stump (Figure 13-59A). Wrap the bandage over the tip from the front to the back, then down over the tip to the front (Figure 13-59B). Hold the top layer of bandage securely on the anterior (front of) leg with your left thumb at the highest edge (Figure 13-59C). Continue to unroll the bandage downward over the tip of the stump then up the back (Figure 13-59D). Hold the bandage firmly on the posterior (back) aspect of the leg with the index finger.

b. Make a fold at the back and bring the bandage over the tip to the front. Move each successive turn alternately to the left, then to the right of the first layer over the tip of the stump in somewhat of a spiral manner (Figure 13-59D).

c. Continue wrapping until the stump end is completely covered. Overlap each layer about one half the width of the previous layer. Continue to hold each succeeding layer securely in place with your thumb and index finger.

d. When the stump is smoothly, evenly, and totally covered, reverse the direction of the bandage and make at least two circular turns to cover the gathered ends that you have been holding with your thumb and index finger (Figure 13-59E).

f. Secure the ends of the bandage (Figure 13-59E).

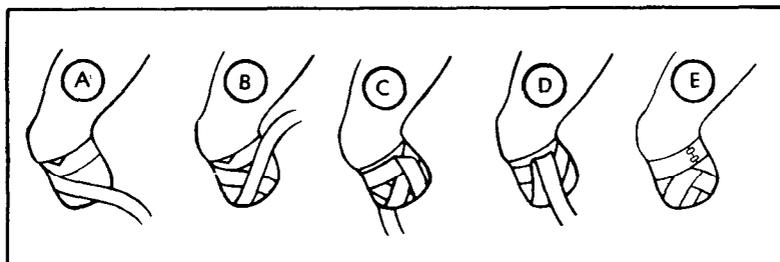


Figure 13-59. Applying a recurrent bandage.

13-49. Apply a Scultetus Binder

The scultetus (many-tailed) binder provides abdominal support after an abdominal operation, post-delivery, or post-paracentesis. The binder is made by sewing heavy flannel strips 3 to 4 inches wide and 4 feet long in overlapping layers of 1/2 inch. The middle third section of the strips is sewed together, leaving 16 inches free on each end.

a. Place the binder under the patient's hips. The solid portion of the binder should be centered under the patient's body, the ends lying flat, extending straight out from the patient. All tails on the binder overlap the next one. The unlapped beginning tail is placed face up at the lower edge of the hips. As each tail is applied, the next tail is unlapped and can be placed smoothly without wrinkles (Figure 13-60).

b. Bring the *bottom tail* across the lower hips (Figure 13-60).

- Begin in the direction in which the tail is going, to provide for smooth, successive spiral-type layers with a 1/2-inch overlap of each layer. Pull tightly. If the end is too long, you may need to fold it back on itself just far enough so that it fits smoothly.

- Incorrect placement of the overlapping tails can cause pressure and discomfort for the patient.

c. Alternate tails first from one side of the abdomen, then from the other side (Figure 13-60). Proceed toward the waist, slanting each succeeding tail slightly upward.

d. Secure the final tail with a safety pin. This type of abdominal bandage provides good support for the patient. If you have pulled it securely enough as you criss-crossed each strip and then firmly pinned it, the patient will be able to move freely about without having the bandage come loose.

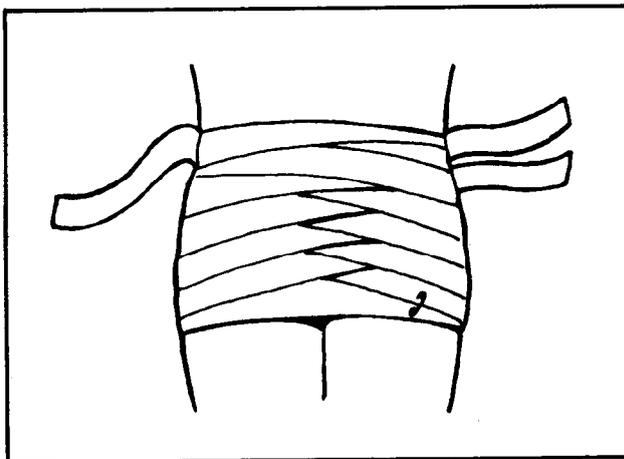


Figure 13-60. Applying a scultetus binder.

13-50. Apply a T-Binder or a Double T-Binder

These binders are used to keep peri-pads (rectal) and perineal dressings in place (Figure 13-61). The double T-binder is used for the male patient. Supplies needed are pins, T-binder, peri-pad, or dressing.

a. Put on the binder (Figure 13-62). Place the band of the binder around the waist and secure with a pin. Smooth out the tail at the back of the binder.

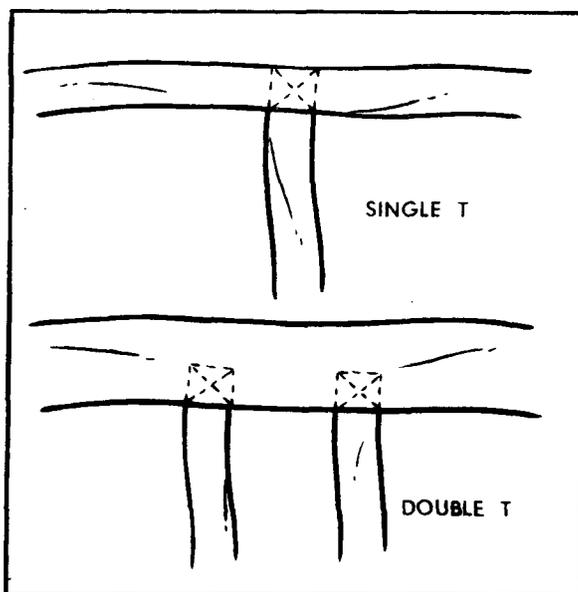


Figure 13-61. T-binder and double T-binder.

b. Apply the peri-pad or dressing to the rectal or perineal area (Figure 13-62). Avoid touching the side of the pad or dressing that will come in contact with the patient's skin.

c. Secure the pad in place. Bring each tail or strip forward, one on each side of the genital organs, and secure them to the waistband with pins (Figure 13-62).

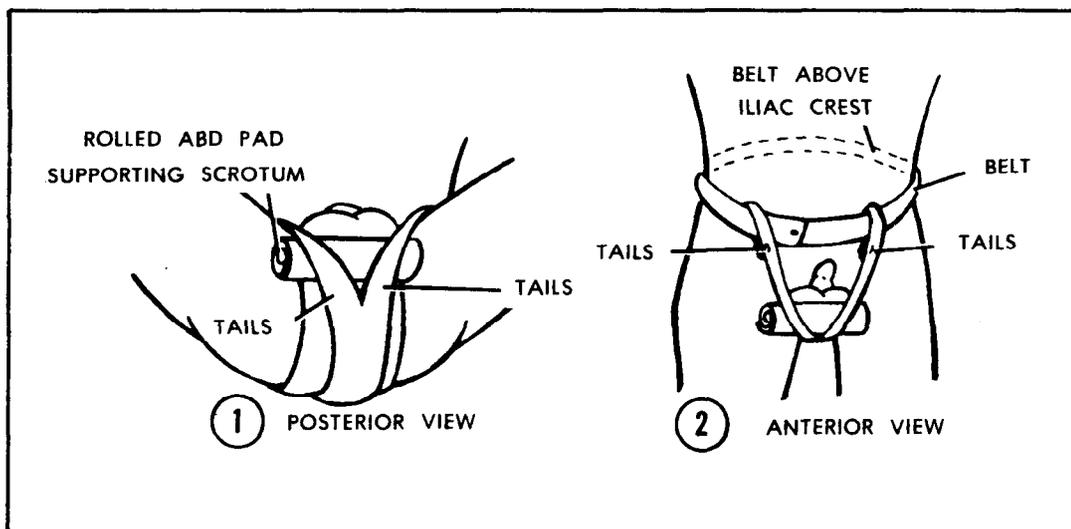


Figure 13-62. Applying a double T-binder.

13-51. The Sling

Patients who have an injury to the arm or shoulder often need to support the arm in an elevated position to avoid edema, pain, discomfort, and fatigue of the hand. A commercially made arm support can be placed about the arm and the straps adjusted around the neck. When this type of arm support is not available, you must improvise a sling using triangular bandages.

13-52. Apply an Arm Sling to an Arm Injury Not Involving the Shoulder

a. Place the upper end of the triangle over the shoulder on the injured side (Figure 13-63A). When placing the bandage between the chest and the injured arm be careful not to cause unnecessary movement which may cause further injury.

b. Place and extend the point (apex) of the bandage beyond the elbow (Figure 13-63A). Carefully bend the injured arm across the body with the thumb up.

c. Bring the lower end over the injured arm and over the shoulder on the uninjured side (Figure 13-63B). Have the patient keep the elbow bend at a right angle across the lower chest. The hand should be slightly higher than the elbow to prevent the fingers from swelling.

d. Bring the upper end around the back of the neck. Tie the two ends on the uninjured side (Figure 13-63C). Place the knot to the side (hollow) of the neck so that it will not be uncomfortable if the patient lies down, or will not cause continuing pull on the back of the neck when the arm is in the sling.

e. Fold the apex of the triangle over the elbow toward the front (Figure 13-63B). Secure it with a safety pin.

NOTE

Pigtailing method: twist the apex and tuck the twisted end (pigtail) into the bandage at the elbow.

f. Check the radial pulse and circulation in the fingers frequently. Observe the color of the fingernail beds; they should be pink. Feel the fingers; they should be the same temperature as the fingers on the uninjured hand. If the pulse is weak or absent, or if the fingers are cold and pale, report this condition to your supervisor immediately.

g. Apply a swathe.

- Fold a triangular bandage to a 6-inch width (Figure 13-63D).
- Place the swathe above the elbow and bring one tail around the patient's back and under the uninjured arm.
- Bring the second tail across his chest and above the injured forearm.
- Tie the swathe above the breast pocket on the uninjured side.

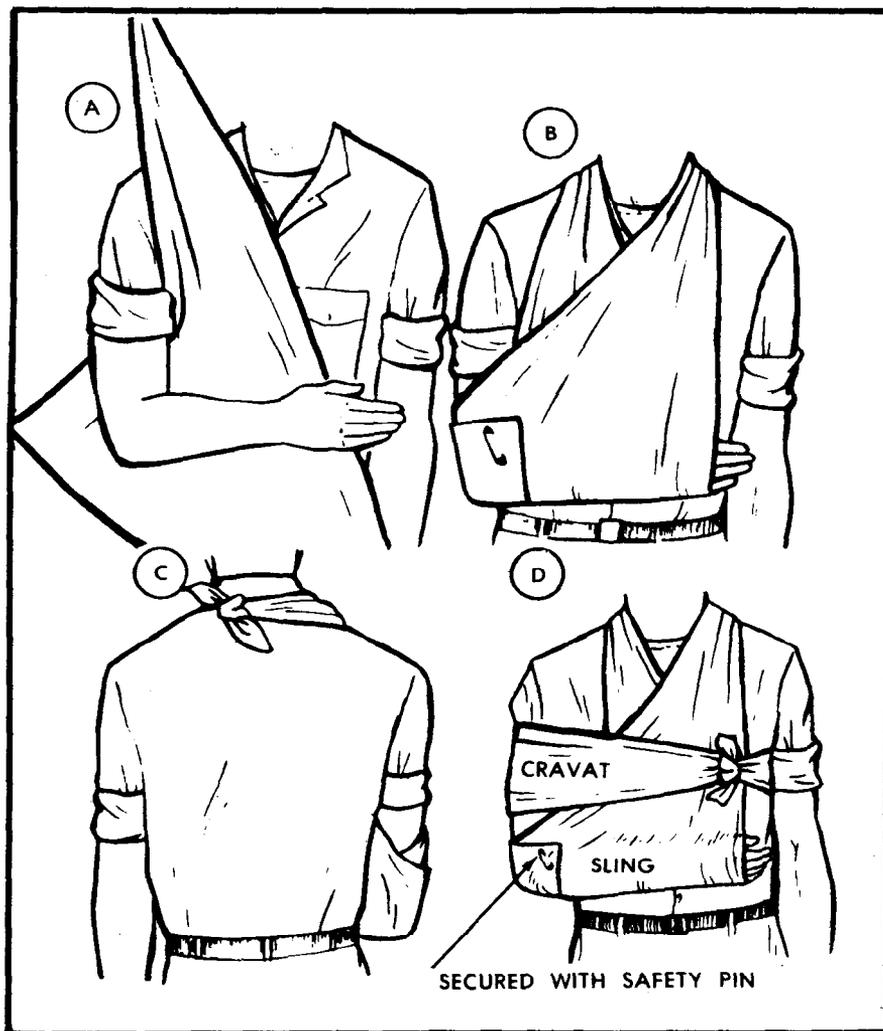


Figure 13-63. Sling and swathe applied to an arm injury.

13-53. Apply an Arm Sling for an Arm Injury With the Shoulder Involved

- a. Place the upper end of the triangle over the shoulder on the uninjured side. The tail should extend to the center of the back (Figure 13-64A).
- b. Place and extend the apex of the bandage beyond the elbow.
- c. Bring the lower end of the bandage up over the forearm and under the armpit on the injured side (Figure 13-64B).
- d. Tie the two ends in the center of the back (Figure 13-64C).

- e. Fold the apex of the triangle over the elbow towards the front. Secure it with a safety pin.
- f. Check the radial pulse and circulation in the fingers.
- g. Apply a swathe.
 - Fold a triangular bandage to a 6-inch width (Figure 13-64D).
 - Place the swathe flush with the elbow and bring one tail around patient's back and under the uninjured arm.
 - Bring the second tail across his chest and above the injured forearm.
 - Tie the swathe above the breast pocket on the uninjured side.

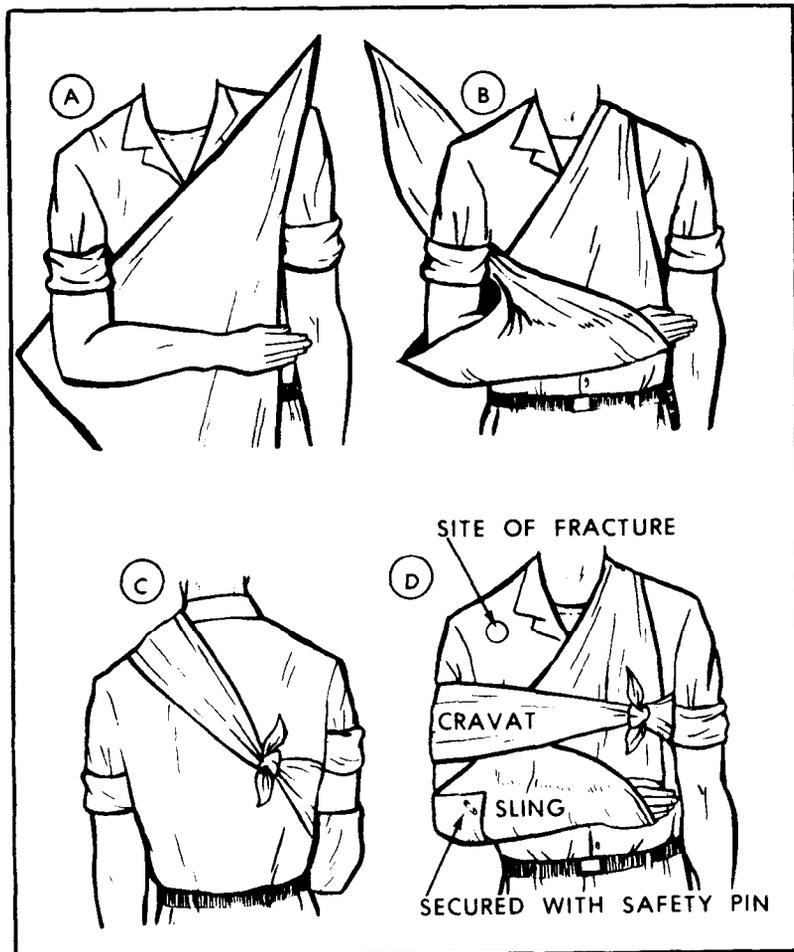


Figure 13-64. Sling and swathe applied to an injured arm and shoulder.

Section VII. SHOCK

13-54. General

a. The term *shock* has a variety of meanings. Generally in medicine, SHOCK means a state of collapse of the cardiovascular system or inadequate tissue perfusion. Shock occurs when the tissues or organs are inadequately supplied (perfused) with oxygenated blood. Inadequate perfusion may be accompanied by decreased arterial blood pressure. Three factors are necessary to maintain normal perfusion; abnormalities in any of these can produce shock:

- A functioning heart, or pump.
- An adequate blood volume.
- An intact vascular system capable of changes in response to changes in blood pressure.

b. Certain organs of the body are more susceptible than others to a lack of adequate perfusion. The brain, spinal cord, and peripheral nervous system cannot lose perfusion for more than 4 to 6 minutes without permanent damage to their cells. Damage in the kidney results after inadequate perfusion for a period of 30 to 40 minutes. The heart requires constant perfusion. A loss of perfusion for 2 hours to the skeletal muscles causes permanent damage. The gastrointestinal tract can exist with impaired perfusion for a number of hours. No part of the body can exist without perfusion for an indefinite period of time. Permanent injury results when the nervous system is damaged.

c. It is important that all medical personnel understand the concept of perfusion because it is the main element in shock. There are a number of separate causes for shock. However, there are only three ways in which each of these separate causes can induce shock. Whatever the cause, the damage comes about when perfusion in organs and tissues is inadequate and they start to die. The three major causes of shock are—

- The heart is damaged and it fails to work as a pump.
- Blood loss causes the volume of fluid within the vascular container to be insufficient.
- The blood vessels dilate so that the blood within them, even though it is a normal volume, is insufficient to provide adequate circulation.

d. In all cases the results are exactly the same—an insufficient perfusion of blood through the organs and tissues of the body. All normal body processes are affected. When a person is in shock, vital functions slow down. If the conditions causing shock are not promptly treated, death soon follows.

13-55. Types and Causes of Shock

Hypovolemic shock, the most common type found on the battlefield, is described in detail. Cardiogenic, septic, and neurogenic shock is discussed separately and compared to hypovolemic shock. Another type, anaphylactic, is only discussed in general terms.

13-56. Hypovolemic Shock

a. Hypovolemic shock occurs when fluid is lost from the intravascular compartment. This loss may result from internal or external hemorrhage, burns, vomiting, diarrhea, excess sweating, peritonitis, or pancreatitis. External hemorrhage is easily recognized as a source of blood loss. However, internal hemorrhage may be hidden. Internal bleeding may occur in the thoracic or abdominal cavities following rupture of the liver, the spleen, or the great vessels within these cavities. Burns produce extensive and alarming losses of plasma and other body fluids into the burned tissues. Significant internal blood loss may occur with bone fractures, especially fractures of the pelvic and long bones. Pelvic fractures from crush injuries often tear associated blood vessels; 40 percent of these patients suffer shock. A fracture of one long bone may result in blood loss of 500 to 1,000 cc's into the surrounding tissues. Femoral-shaft fractures may produce blood losses of 1,000 to 2,000 cc's.

b. When dehydration (loss of body water) is present prior to the injury, the state of shock is worsened. This is commonly seen in personnel wounded in the tropics where constant exposure to the sun and high humidity causes excessive sweating.

c. There are many factors in the body's response to shock. When blood volume is lost, less blood returns from the body to the heart and decreases cardiac efficiency. The response is an increase in the discharge of norepinephrine and epinephrine. An increase of these substances results in contraction of peripheral blood vessels with a stronger and more rapid heart beat. These changes return the blood pressure toward normal limits; however, there is decreased circulation to peripheral tissues. This provides improved perfusion in the brain and lungs. When the volume of blood loss is so great that these mechanisms can no longer compensate, the blood pressure remains depressed. As the body continues to contract peripheral blood vessels, more and more body areas are deprived of blood flow.

13-57. Signs and Symptoms of Hypovolemic Shock

a. Hypovolemic shock is due to inadequate tissue oxygenation and the nervous system's response to decreasing blood pressure. The patient in hypovolemic shock often appears to be simply confused and disoriented. He may look apprehensive (scared). His respirations are rapid and shallow, and his pulse is fast and thready. Peripheral veins will be collapsed when you look for them to start an IV. The skin is usually cold, clammy, and pale. Cyanosis may be present. Finally, the blood pressure may be falling. DO NOT rely on blood pressure alone to diagnose shock. Falling blood pressure is a late sign of shock and signals the collapse of the cardiovascular system.

b. Use the blood pressure and pulse to estimate blood loss. A systolic blood pressure less than 70 mm Hg together with a pulse rate greater than 130 beats per minute implies at least a 40 percent loss of blood volume. When the blood pressure cannot be obtained at the arm, use the following as a rough guide: When a femoral pulse is palpable, the systolic blood pressure is probably at least 70 mm Hg; if a carotid pulse is palpable, the systolic pressure is probably at least 60 mm Hg; and if a radial pulse is palpable, the systolic pressure probably exceeds 80 mm Hg. It should be noted that the pulse and blood pressure should be evaluated to determine management.

c. To estimate blood loss from causes other than trauma, you may also use the postural test. To perform a postural test, take the patient's pulse rate while he is lying down. Then have him sit up and quickly retake his pulse. If the pulse rate increases by more than 20 beats per minute when the patient sits up, there has been a blood loss of at least one unit (500 cc's). In managing hypovolemic shock, the goal is to maintain perfusion in the vital body organs with oxygenated blood. The best indication of brain perfusion is the patient's level of consciousness. If the patient is conscious and alert, the brain is adequately perfused. If the patient is confused, disoriented, or unconscious, brain perfusion is probably inadequate.

d. An effective and simple method of classifying hypovolemic shock is as follows:

- Class 1 Hemorrhage—slight increase in pulse rate with normal blood pressure, respirations, and capillary blanch test. The acute blood loss is about 15 percent of the total circulating volume or a maximum of 750 cc's in a 70 kg male.

- Class 2 Hemorrhage—the pulse rate is above 100 with rapid breathing (tachypnea). The systolic pressure has dropped or is normal with an increased diastolic pressure. The acute blood loss is about 20-25 percent of the total circulating volume, or about 1,000-1250 cc's.

- Class 3 Hemorrhage—an acute blood loss of about 30 percent of the circulating volume, 1500-1800 cc's of whole blood. This patient presents the classical clinical signs of hypovolemia, including significantly depressed blood pressure.

- Class 4 Hemorrhage—there is an acute blood loss in excess of 2,000-2500 cc's. Blood pressure is barely or nondetectable. Carotid pulse only is detectable, if at all. The part of the brain which receives and interprets sensations (the sensorium) is depressed.

13-58. Treatment for Hypovolemic Shock

a. Evaluate and establish an airway. Insure that the patient's breathing and ventilation are adequate.

b. Determine adequate circulation by evaluating the cardiac efficiency. Check for a pulse at one location and record its—

- Character, such as normal, weak, or intermittent.
- Rate.
- Location, such as radial, femoral, or carotid.

NOTE

Capillary filling is abnormal if they take more than 2 seconds to refill.

c. Perform resuscitation, if necessary.

d. Apply military antishock trousers (MAST) (refer to paragraph 13-59 for use of MAST) to mobilize 1,500 to 2,000 cc's in the lower extremities and abdomen and to increase lower extremity peripheral resistance. This accomplishes three functions:

- It increases cardiac efficiency.
- It provides most blood circulation to the sensitive heart, brain, and lung.
- It also slows intra-abdominal hemorrhage. The inflation of the MAST is based on the patient's blood pressure. Measuring the pressure inside the trouser compartments is not an adequate method of determining changes in the patient's blood pressure. The trousers remain inflated until the patient's blood pressure returns to 100 mm Hg or higher.

e. Administer two large-bore peripheral IVs at a TKO rate. When the MAST trousers are inflated first, the peripheral veins are much easier to find.

NOTE

If MAST is not available in the field, elevate the lower extremities by raising the legs from the hips, keeping the knees straight. This maneuver will increase the blood flow returning to the heart and aid in combating shock. When the patient's legs cannot be elevated, place him on a litter and elevate the foot portion of the litter. However, in this position, the entire weight of the abdominal organs falls on the diaphragm and the patient may not be able to breathe as easily and may require assisted ventilation. **DO NOT ELEVATE THE FEET MORE THAN 12 INCHES.**

f. Check vital signs. The patient's vital signs, including pulse, capillary filling, circulation, respiration, skin color, diaphoresis (profuse perspiration), level of consciousness, and pupillary changes should be checked at least every 5 minutes throughout the assessment, stabilization, and evaluation phases.

g. Evacuate the patient. After stabilizing procedures have been completed, transport the patient as rapidly as possible to a treatment facility.

13-59. Antishock Garments

a. The Military Antishock Trousers, antishock garment, or pneumatic counter-pressure device is designed to counteract or reduce internal bleeding and aid in treating hypovolemic shock. The antishock garment does this by developing an encircling pressure around the lower extremities, pelvis, and abdomen. The pressure applied to the legs squeezes up to 2 units of blood

out of these extremities, where it is less critically needed, and into systemic circulation. This is the same principle used in applying local pressure to control hemorrhage. Normally, the pressure exerted is 100 mm Hg. This pressure—

- Stops or slows venous and arterial bleeding in the areas of the body enclosed by the pressurized garment.

- Forces available blood from the lower body to the heart, brain, and other vital organs.

- Prevents blood pooling in the lower extremities.

b. There are several advantages with the use of an antishock garment other than the prevention of further blood loss and the direction of circulating blood to vital organs. Some of the many advantages are—

- The MAST serves as an air splint for fractures of the lower extremities or the pelvis. However, femur fractures should be placed in a traction splint before applying the MAST.

- The garment often stabilizes a patient so effectively and quickly that other patients with more critical injuries can be treated first. Patient monitoring is still required.

- Diagnosis and preparation for surgery may be delayed for an hour or more when a patient is stabilized with the MAST. Without the use of MAST, often an unstable patient must be prepared for immediate surgery.

- A Foley catheter can be inserted while a patient is in an inflated MAST.

- Electrocardiograms (ECGs) and x-rays can also be taken while a patient is in an inflated MAST.

13-60. Indications for Use

Antishock garments are indicated for low volume shock or low resistance shock. Antishock garments are recommended if—

- Systolic blood pressure is 80 mm Hg or less.

- Systolic blood pressure is less than 100 mm Hg and other signs of shock are present.

NOTE

They may also be used for neurogenic shock, for temporary venous volume assistance in order to get an IV started, or for continuous pressure.

- Profuse bleeding is present from injuries to the lower extremities and pelvis, or there is intra-abdominal bleeding.

13-61. Contraindications for Use

Contraindications for use of the antishock garment are—

- Bleeding about the diaphragm since the possibility exists of increasing the bleeding as the blood pressure increases.
- Pulmonary edema will always worsen as fluid is moved up from the legs.
- Congestive heart failure.
- Heart attack.
- Cerebrovascular accident (stroke).
- Pregnancy, unless the abdominal compartment can be left uninflated.

13-62. Application of the MAST Garment

- a. Lay out the MAST garment (Figure 13-65).
- b. Place the patient on the garment face up with the top of the garment just below the lowest ribs.
- c. Wrap the left leg of the garment around the patient's left leg and secure it (Figure 13-66A).
- d. Wrap the abdominal section around the abdomen and secure it (Figure 13-66B).
- e. Wrap the right leg of the garment around the patient's right leg and secure it (Figure 13-66C).
- f. Attach the foot pump (Figures 13-67).
- g. Inflate both legs at the same time until the garment is firm to the touch or the relief valves allows air to escape.
- h. Close the inflation/deflation valves to keep the garment from deflating.
- i. Check the patient's blood pressure. If it is within normal limits, the abdominal section need not be inflated. If the blood pressure is below accepted levels, inflate the abdominal section (except on pregnant patients) while monitoring the patient's blood pressure. Stop inflation and close the valve when the patient's blood pressure is within normal limits or air escapes from the relief valves.

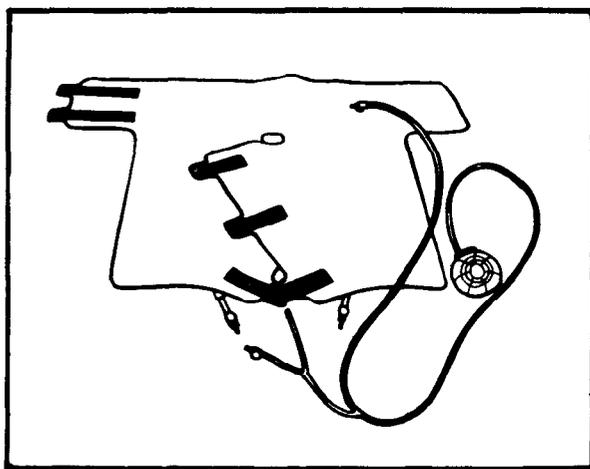


Figure 13-65. Layout the MAST garment.

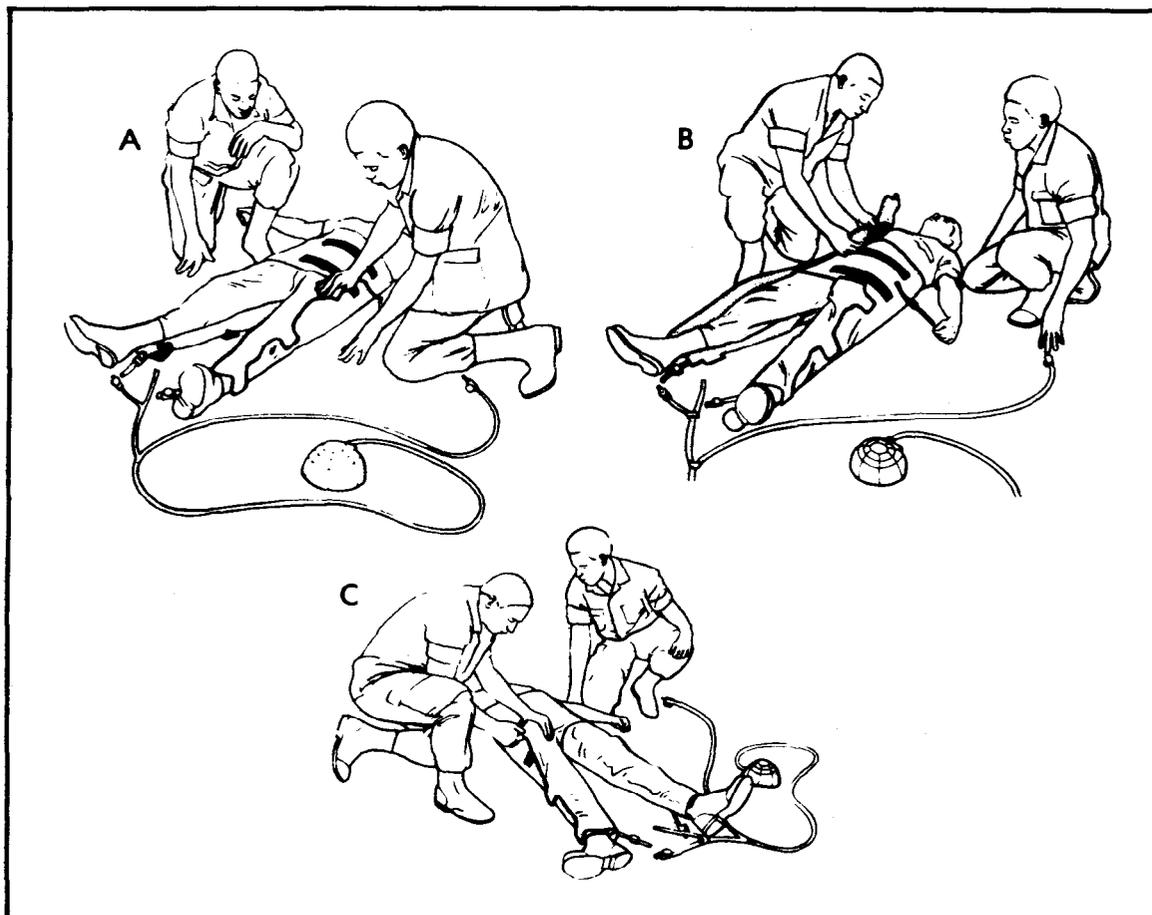


Figure 13-66. Applying the MAST garment.

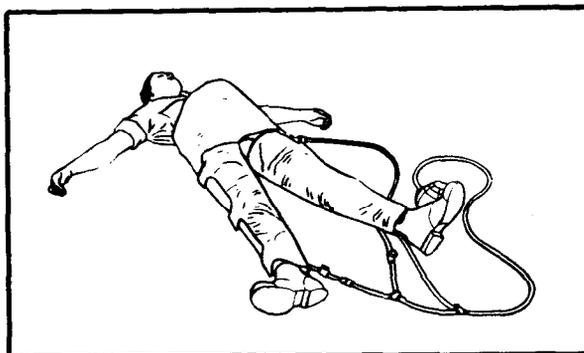


Figure 13-67. Attaching foot pump.

13-63. Deflation/Removal of MAST Garment

a. The garment can be removed *only after shock* is adequately managed and vital signs are within acceptable limits. Even at this point, the deflation is a gradual one. Remember, rapid deflation is equivalent of *losing two units of blood* (20 percent of the normal circulating volume)! The garment is to be removed only in a definitive treatment facility.

NOTE

If the patient is to be evacuated by helicopter, the pressure in the MAST will increase due to atmospheric changes. This is also true if the garment is applied in a cold environment and the patient is taken into a warm area. The reverse is true (the pressure decreases) if the garment is applied at high altitude and the patient is taken to a lower altitude or from a warm to a cold environment.

b. Deflation begins with the abdominal section. Slowly release the air while *continuously* monitoring the patient's blood pressure. Continue deflation until the patient's blood pressure shows a drop of 5 mm Hg. Stop the deflation at this point and administer intravenous fluid or blood until the blood pressure returns to normal. Continue the slow gradual deflation in this manner until the abdominal section is completely deflated. Then deflate each leg individually in the same way.

NOTE

The patient may be transferred to other facilities or to the operating room with the MAST garment in place. Transfer of the patient is not a reason to remove the garment.

13-64. Cardiogenic Shock

Cardiogenic shock is caused by an inadequate function of the heart. Circulation of the blood requires the constant action of a normal and vigorous heart muscle. Many types of disease cause the destruction or inflammation of this muscle. Within limits, the heart can adapt to these injuries; but if too much weakness or damage occurs, the heart no longer functions well. It may also be caused by cardiac arrhythmias, chronic congestive heart failure, or pericardial tamponade (blood in the pericardial sac compresses the heart and prevents effective heart action).

13-65. Signs and Symptoms

The physiologic effects of cardiogenic shock are similar to those of hypovolemic shock. However, in cardiogenic shock the signs and symptoms coexist with those of the underlying cardiac problems.

13-66. Treatment for Cardiogenic Shock

- a. Establish an airway.
- b. Administer oxygen (if available) and assist ventilation (if necessary).
- c. Monitor vital signs and level of consciousness.
- d. Start an IV with dextrose, 5 percent, in water (D5W) at a TKO rate.
- e. Keep the patient at normal temperature. Use blankets if hypothermia develops.
- f. Administer drugs to correct specific cardiac problems *only if they are ordered by the physician.*
- g. Record treatment given.
- e. Evacuate the patient.

13-67. Septic Shock

Septic shock develops in some patients with sepsis (the presence of bacteria in the blood stream). Sepsis most frequently occurs in a patient who has infections in other parts of his body. Common conditions that predispose to sepsis are diabetes, cancer, cirrhosis, immunosuppressive drug therapy, biliary tract obstruction, ulcerative colitis, and postpartum and postabortion infections. There are several physiologic effects of septic shock, such as increased cardiac efficiency, dilated peripheral blood vessels, hypotension, and peripheral blood pooling. These effects are partly caused by arteriovenous shunting (circulation of blood from arteries to veins, bypassing the capillary beds).

13-68. Signs and Symptoms of Septic Shock

The signs and symptoms of septic shock resemble those of hypovolemic shock. However, in septic shock, the skin may remain warm and dry. The patient in septic shock usually has an elevated body temperature due to the underlying infection.

13-69. Treatment for Septic Shock

- a. Establish an airway.
- b. Administer oxygen. Assist ventilation, if necessary.
- c. Monitor vital signs and level of consciousness.
- d. Start at least one IV line with a large-bore (14-16 gauge) catheter. Infuse normal saline or Ringer's solution at a keep open rate.
- e. Keep the patient at normal temperature. Sponge if febrile, using cool water.
- f. Monitor cardiac rhythm (if possible).
- g. Record treatment.
- h. Evacuate the patient.

13-70. Neurogenic Shock

Neurogenic shock results from loss of normal vasoconstriction. Neurogenic shock occurs with spinal cord transection or severe spinal cord injuries. Drugs that depress the central nervous system may produce neurogenic shock. There are transient and easily correctable forms, such as fainting at the sight of blood. Neurogenic shock differs from the other types of shock in the loss of response to decreased blood pressure. Peripheral vasoconstriction no longer occurs when the blood pressure decreases. The loss of vasoconstriction increases the capacity of the large veins without increasing the blood volume. Because the blood volume is then smaller than the vascular space, venous return decreases. Since the heart receives less blood from the veins, it has less blood to pump to the arteries and the cardiac efficiency falls, further lowering blood pressure. Sympathetic stimulation of the heart is also lost in neurogenic shock. This means that the rate and force of cardiac contractions do not increase when the blood pressure falls.

13-71. Signs and Symptoms of Neurogenic Shock

Because the sympathetic response to falling blood pressure is absent, the signs and symptoms of neurogenic shock differ significantly from those of other types of shock.

- The blood pressure is low, but the pulse may be normal or low.
- The skin is dry, warm, and may even be flushed.

13-72. Treatment for Neurogenic Shock

- a. Neurogenic shock may be temporary. If it causes fainting, the patient should be kept flat, and the underlying problem (an upsetting environment) should be corrected.

b. For severe neurogenic shock—

- (1) Establish an airway.
- (2) Administer oxygen and assist ventilation, if necessary.
- (3) Monitor vital signs and level of consciousness.
- (4) Apply and inflate the MAST.
- (5) Start at least one large-bore IV line. Rapidly infuse lactated Ringer's or normal saline (NS) solution if the MAST has not restored the blood pressure.
- (6) Keep the patient at normal temperature. Use blankets to prevent hypothermia. Because vasodilation in skin arterioles increases body heat loss, these patients have difficulty maintaining a normal body temperature.
- (7) Monitor cardiac rhythm, if possible.

c. Record treatment.

d. Evacuate the patient.

13-73. Anaphylactic Shock

Anaphylactic shock occurs when an individual has become sensitized to a substance and reacts violently to another dose or contact. Anaphylaxis is the most severe form of an allergic reaction. Substances that most often cause allergic reactions may be grouped as follows:

- **Inhalants** (substance breathed in). The inhalation of pollen, dusts, or materials to which a patient is sensitive may cause rapid and severe reactions.
- **Insect stings**. Stings of bees, wasps, yellow jackets, hornets, or ants can cause very rapid and severe anaphylactic reaction.
- **Ingestables**. Eating food such as fish, milk products, chicken, tomatoes, berries, and mushrooms, or taking medications such as oral penicillin can cause severe reactions.
- **Injectables**. Injectable medications such as penicillin, tetanus antitoxin, and a variety of other vaccines may cause anaphylactic reaction.
- **Plants**. Touching poison oak, ivy, sumac, and some flowers will cause a reaction.

13-74. Signs and Symptoms

Anaphylactic reaction occurs in minutes or even seconds following contact with the substance to which the patient is allergic. The respiratory system, circulatory system, and skin may all be affected.

- *Respiratory system.* The smaller bronchi constrict and air passage is increasingly difficult; wheezing results, especially on expiration. Fluid is drawn into the bronchi and the patient tries to cough it up. There is a tightness or pain in the chest with an irritating and persistent cough.

- *Circulatory system.* There is a noticeable drop in the blood pressure, a weak or rapid pulse, pallor, and dizziness. Faintness, coma, and even death may follow.

- *Skin.* Swelling of the lips may be seen. Cyanosis may become rapidly visible about the lips. The skin may be flushed, itching, or have a burning sensation, especially the face and upper chest. Hives may spread over large areas of the body. Edema, especially of the face and tongue, may occur.

13-75. Treatment for Anaphylactic Shock

Death is imminent unless treatment is begun immediately.

- a. Establish an airway and administer oxygen (if available). In cases of airway obstruction from severe glottic edema, a cricothyroidotomy may be necessary. The most experienced medical person available should perform the emergency airway procedure, if required.

- b. Monitor vital signs and level of consciousness.

- c. Start at least one large-bore IV line with D5W or NS and administer epinephrine as *instructed by the physician*. If an IV is difficult to start; give 0.5 ml of 1:1,000 aqueous epinephrine subcutaneously.

- d. Keep the patient at normal temperature.

- e. Monitor cardiac rhythm (if possible).

- f. Record treatment.

- g. Evacuate the patient.

Section VIII. CONTROL OF HEMORRHAGE

13-76. Hemorrhage

- a. Hemorrhage is excessive bleeding. It may be caused by a wound or by a disease. Whatever the cause, it is a serious threat to life and requires prompt control.

- b. When a blood vessel wall is opened, the body reacts with measures to check bleeding. Two natural body responses to bleeding are blood clotting and retraction or constriction of blood vessels. The muscles in an injured vessel contracts and if the vessel is severed, the contraction pulls the damaged vessel back into the tissues, thus tending to close the leak. These natural responses must be helped by artificial means to control hemorrhage.

13-77. Treatment for External Hemorrhage

a. Cut, tear, or lift clothing or other material from the wound without causing additional injury to the patient..

b. Apply a pressure dressing to the wound. The purpose of applying the sterile dressing (Figure 13-68) with pressure to a hemorrhaging wound is threefold—

- *Assistance in clot formation.* The dressing is an absorbent material which spreads and slows the flow of the blood that it absorbs. This spreading and slowing action exposes a relatively large, thin surface of the outflowing blood to the air and speeds up the clot formation. One dressing partially filled with the patient's blood is more effective in controlling hemorrhage than are a series of others because the clot formation is in progress in the bloody dressing. The clot formation spreads back toward and into the wound diminishing air exposure. It is the clot that stops the hemorrhage. When blood begins to clot, it turns darker in color and becomes progressively darker as the clot takes form. A hard clot is almost black.

- *Vessel compression.* The applied pressure reduces the size of the vessel opening, reducing the amount and the velocity of escaping blood, aiding clot formation. Hemorrhage does not always immediately stop. At times, hard pressure on the dressing over the wound may be required for several minutes until a clot has formed with sufficient strength to hold with only the help of the dressing ties. Anchor the dressing over the wound with the dressing knots tied over the wound (Figure 13-69). Anchor the dressing snugly to prevent slipping, but not excessively tight. (The wounded body part, especially an arm or leg, will swell after a time. The swelling will tighten the bandage more, impairing or stopping circulation in the part.) Signs of renewed hemorrhage from the wound may appear after a dressing is snugly in place. The reapplication of manual pressure may be all that is necessary to assist in formation of a clot that will stop the hemorrhage. Signs of renewed bleeding are the reappearance of fresh blood or an enlargement of the bloodstain on the outer surface of the dressing. Also, blood trickling between the dressing and the skin is a sign of continued bleeding.

- *Protection from infectious organisms.* An external wound becomes contaminated with microorganisms at the moment of occurrence. The prompt application of a sterile dressing limits the entrance of additional infectious organisms. Once a dressing is applied, leave it in place, if possible. Removal permits entrance of microorganisms and may disturb the blood clot. Also, leaving the original dressing in place helps medical personnel treating the wound later to estimate the amount of blood loss. When dressing a wound, take care to avoid touching the wound or the surface of the dressing that is to be placed directly on the wound. Breathing on the dressing or wound, or stirring up dust around the patient will increase the hazards of contamination.

c. Elevate the wounded limb. Hemorrhage, especially venous bleeding, can be reduced by raising the wounded limb to a level above the heart. Elevation helps lower the blood pressure at the wound site. Elevation may be used before, during, or after application of a pressure dressing. Serious hemorrhage, especially arterial bleeding, may require simultaneous application of elevation, dressing, and pressure. As elevation drains the limb by gravity, an initial gush of blood downward from open veins may occur when the limb is first elevated. Broken bones must be splinted before elevating the limb.



Figure 13-68. Application of pressure dressing.

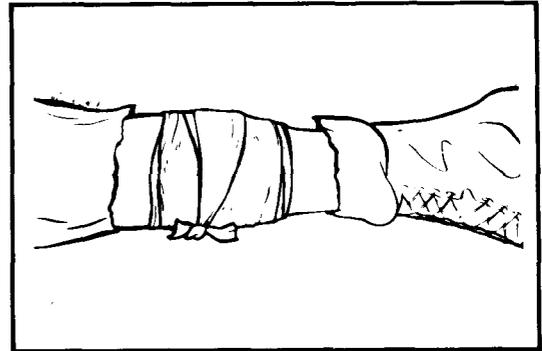


Figure 13-69. Pressure dressing knots tied over the wound.

d. Use pressure points. A pressure point is a place where a main artery supplying the wounded area lies near the skin surface and over a bone. Pressure at these points (Figure 13-70) is applied with the fingers, thumbs, or hands. The object of the pressure is to occlude the artery between the wound and the heart by compressing the artery against the bone, thus shutting off the blood flow from the heart to the wound. It is very difficult to maintain manual occluding pressure on a pressure point; therefore, this method is used only until a pressure dressing can be applied.

- *Temple or scalp.* Hemorrhage from the temple or scalp is controlled by compressing the main artery to the temple against the underlying skull bone (Figure 13-70A) just in front of the ear and above the prominent cheek bone (zygomatic arch).

- *Lower face.* Hemorrhage of the face below the level of the eyes is controlled by compressing the artery in the notch on the under side of the lower jaw (mandible) (Figure 13-70B). Locate this notch by running your finger from the angle of the jaw forward until the notch is encountered on the under side.

- *Neck.* Hemorrhage of the neck is controlled by compressing the carotid artery against the spinal column by pressing inward and slightly backward (Figure 13-70C). When this pressure point is used, care must be taken not to choke the patient.

- *Shoulder or upper part of upper arm.* Hemorrhage from either of these areas is controlled by compressing the artery against either the clavicle (Figure 13-70D) or the first rib; usually pressure against the rib produces less pain in the patient.

- *Mid-upper arm and elbow.* Hemorrhage from either of these areas is controlled by compressing the artery against the bone of the upper arm (humerus) (Figure 13-70E).

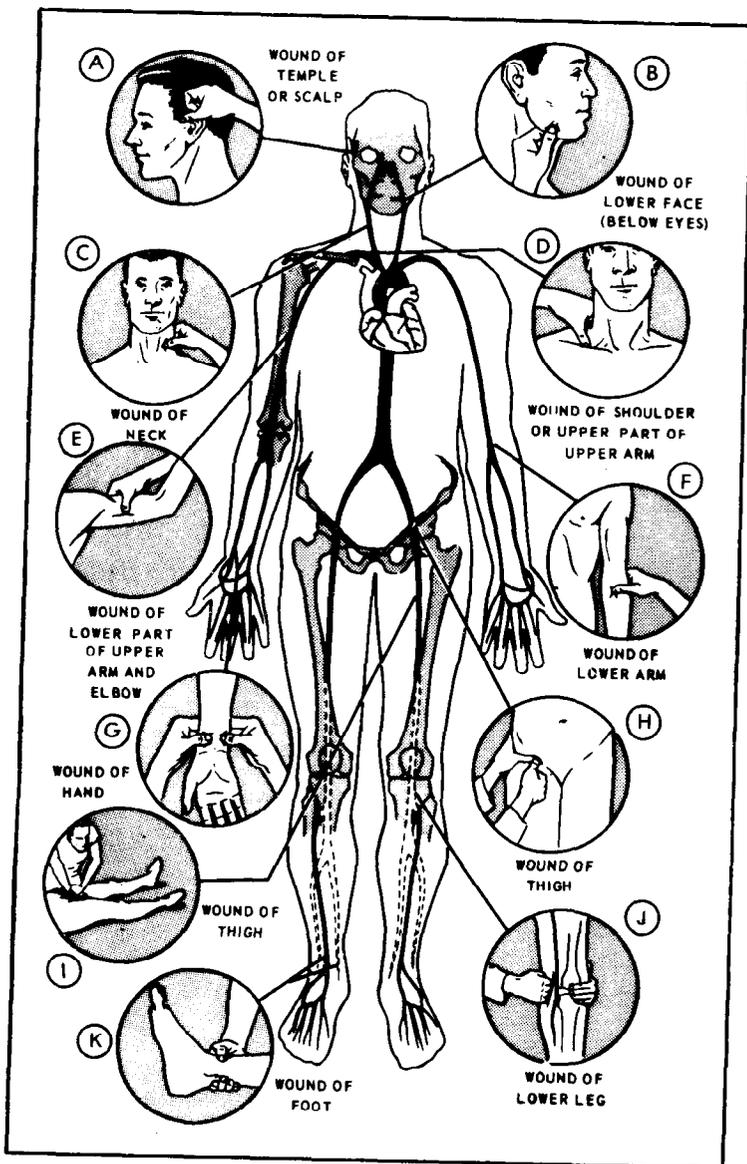


Figure 13-70. Pressure points for control of arterial bleeding.

- *Forearm.* Hemorrhage from the lower arm is controlled by applying digital pressure at the elbow (Figure 13-70F).

- *Hand.* Hemorrhage from the hand is controlled by applying digital pressure at the wrist (Figure 13-70G).

- *Thigh.* Hemorrhage from the thigh is controlled by digital pressure against the mid-groin from behind (Figure 13-70H), collapsing the artery against the bone of the thigh (femur). At times, pressure against the inner aspect of the mid-thigh may be more effective. If the mid-thigh pressure point is used, pressure should be applied with the heel of the hand while the hand is closed into a fist and is reinforced by the other hand placed on top (Figure 13-70I). Considerable pressure is necessary at this point to collapse the femoral artery against the femur because both are deeply imbedded in some of the heaviest musculature of the body.

- *Lower leg.* Hemorrhage from the leg between the knee and the foot is controlled by firm pressure at the knee. Pressure at one or both sides of the knee may be sufficient. If not, hemorrhage is controlled by holding the front of the knee firmly with one hand (Figure 13-70J) and thrusting a fist hard against the artery behind the knee (popliteal).

- *Foot.* Pressure by the hand around and just above the ankle is effective in controlling hemorrhage from the foot (Figure 13-70K).

e. *Use of the Tourniquet.* A tourniquet is a constricting band placed around the circumference of one of the extremities (arms and legs). When used, its purpose is to stop hemorrhage. The use of a tourniquet is a *LAST* resort; other control measures must be used *FIRST*.

- *Judgement.* In emergency medical treatment situations, mature judgment is required in making the decision to apply or withhold a tourniquet. Blood flow stops at the tourniquet. Without circulating blood, cells in the limb distal to the tourniquet soon begin to die. Surgical amputation of the limb distal to the tourniquet application point does not always follow. The decision to apply a tourniquet must be done with the realization that the distal portion of the limb may be sacrificed. The application of a tourniquet must represent a choice between saving a life and saving a limb. It must NOT represent a choice between the quick results it produces and the time-consuming application of a pressure dressing. The decision to apply a tourniquet is irreversible. Once a tourniquet has been applied, it must be left in place until it is removed by a physician/physicians' assistant. The physician/physicians' assistant must see the patient as soon as possible. Do not loosen the tourniquet in the mistaken belief that the portion of the limb distal to the tourniquet is being kept alive.

- *Guideline.* Pressure points, pressure dressings, and elevation of limbs are used first. Nonetheless, hemorrhage from a major artery of the leg or arm, or from multiple arteries as seen in a traumatic amputation may be beyond the control of these methods. There is no set rule as to how long one should continue trying to control hemorrhage by pressure dressing and elevation. However, in an emergency situation, the absorbent capacity of one first-aid dressing may be used as a guideline.

- o If the blood lost by the patient is contained in the first-aid dressing applied to the wound, the blood loss is probably not more than 500 ml. This is the amount drawn from a blood donor. Thus, if the dressing becomes soaked through with blood and signs of clotting are present, continue pressure with elevation. Additional absorbent material placed over that already in place will aid in the clot formation and stop the hemorrhage.

o Do not assume that a traumatic amputation is not going to bleed. Initially a traumatic amputation may have little bleeding. A pressure dressing and a tourniquet is always needed on traumatic amputations.

f. Application of the tourniquet.

(1) Place the tourniquet around the limb between the wound and the heart. Never place it directly over a wound or fracture. Place the tourniquet approximately 2 inches above the wound site. For wounds just below a joint, place the tourniquet above the joint (Figure 13-71).

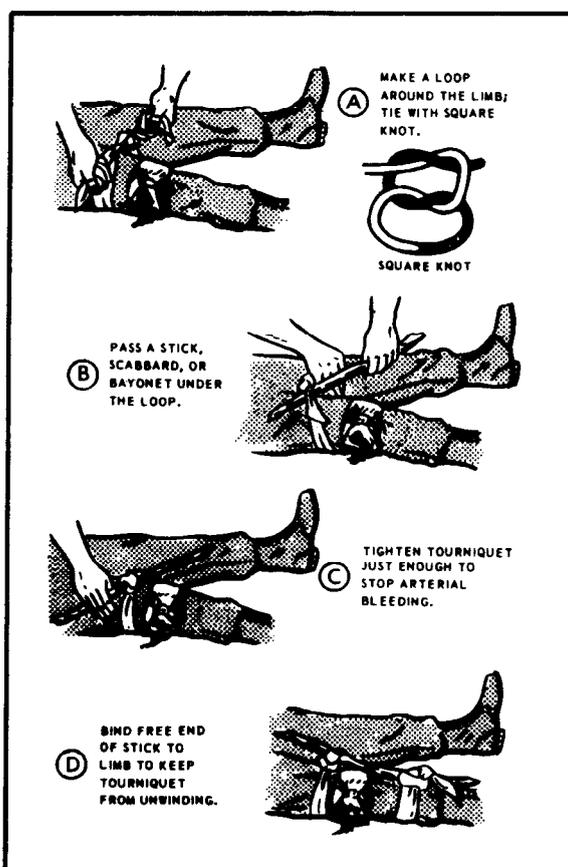


Figure 13-71. Application of a tourniquet to stop bleeding.

(2) In the absence of an issue tourniquet, an improvised tourniquet can be made from strong, soft, pliable material such as gauze, broadcloth bandage, clothing, or kerchiefs. This material is used with a rigid stick-like object. To minimize skin damage, the improvised tourniquet should be at least 1 inch wide after tightening. If gauze bandage is used, 3 inch and 4 inch widths are preferable to the 2 inch width.

(3) Apply the tourniquet with enough pressure to stop blood from passing under it. If a pulse has been detectable in the intact wrist or foot of the affected limb, tourniquet pressure is sufficient when that pulse ceases. If a pulse cannot be used as an indicator, you must rely on the reduction of blood flow from the wound. After a tourniquet is properly tightened, arterial hemorrhage will cease immediately, but venous bleeding in the distal part of the limb will continue until blood already in them is drained. You should not continue to tighten the tourniquet in an attempt to stop this drainage. When the tourniquet is tight, tie the tightening device parallel to the extremity.

(4) Protect the skin beneath the tourniquet from pinching, twisting, and tourniquet overtightening. Skin is relatively resistant to oxygen deprivation and may survive even though the limb beneath it requires amputation later. Damaging the skin with the tourniquet may deprive the surgeon of skin needed to cover the amputated stump. Skin damage will force the surgeon to amputate more of the limb than might otherwise have been necessary. Protect the skin by placing soft, *smooth* material such as a shirt sleeve or trouser leg around the limb and beneath the tourniquet before tightening. Protecting the skin also reduces the amount of pain inflicted on the patient.

g. Splinting. After arterial hemorrhage has ceased and the tourniquet is securely in place, splint the extremity to prevent further injury.

h. Covering and marking the patient. The patient's condition and the weather may require that he be covered. If so, arrange the covering so that the tourniquet remains in view. In addition, note the presence of a tourniquet by plainly marking the patient's—

- Forehead with a large letter "T" mark to indicate that a tourniquet is in place. Also indicate the time the tourniquet was applied.
- Field medical card with the time and date the tourniquet was applied.

i. Monitoring. Inspect the tourniquet and dressing every 15 minutes to assure that arterial hemorrhage has not started again until absence or stability of the bloodstained area on the outside of the dressing indicates that venous drainage has stopped. Afterwards the tourniquet and dressing should be inspected periodically and adjusted if either has slipped. If at any time, arterial hemorrhage is indicated, tighten the tourniquet further. Retighten the tourniquet without loosening, lifting, or removing the wound dressing.

13-78. Epistaxis

Although epistaxis (nosebleed) is considered a common occurrence, it can be a dangerous condition if not treated promptly and correctly. Some individuals have a history of simple nosebleed not complicated by other conditions. It can be caused by trauma, crusting of nasal mucosa from dry air, or irritation. However, in the case of a facial or a head injury, nosebleeding can be serious and require immediate treatment.

13-79. Treatment for Epistaxis

a. Treatment is usually simple and straightforward. However, if the patient is losing large amounts of blood, take steps to minimize the blood loss and prepare the patient for evacuation.

- Determine the cause of epistaxis.
- Tell the patient not to breathe through or blow his nose since this will aggravate the bleeding.
- Have him sit facing you and tilt his head slightly forward.
- Tell the patient to pinch the fatty part of his nose (around the nostrils) for approximately 5 to 10 minutes.
- Apply cold compresses, if available, to the bridge of the nose to aid in slowing down the bleeding.
- If the bleeding continues and there is danger of excessive blood loss and the possibility of subsequent shock, prepare the patient for evacuation.

b. Estimate the amount of blood loss. If the patient is vomiting large amounts of fresh (red) or old (color of coffee grounds) blood, there may be a significant blood loss. Evacuate the patient.

NOTE

The type and estimated amount of blood vomited should be reported.

- c.* Treat for shock, if necessary.
- d.* Obtain a short history of the patient (if the tactical situation permits). If the patient has a history of uncomplicated spontaneous bleeding from the nose, he may be able to control the present nosebleed.
- e.* Obtain and record the vital signs. Also, record treatment.
- f.* Evacuate the patient, if necessary.

Section IX. CARDIAC ARREST AND CARDIOPULMONARY RESUSCITATION

13-80. General

a. Cardiac arrest (sudden death) is an abrupt, unexpected cessation of pulse and circulation. Electrical shock, drowning, or massive blood loss can cause cardiac arrest. There are two stages of cardiac arrest.

(1) Clinical death is the stopping of the heartbeat and respiration. Time elapsed is zero minutes.

(2) Biological death follows clinical death in approximately 4-6 minutes. During this stage irreversible brain damage occurs. Therefore, emergency life saving actions must begin immediately (within 2 minutes).

b. Cardiac arrest accounts for over 250,000 deaths each year, with most deaths occurring before the victim reaches the hospital. Many of these deaths can be prevented by taking quick emergency steps within the first 2 minutes after the arrest.

13-81. Signs and Symptoms of Myocardial Infarction (Heart Attack)

Myocardial infarction is the single largest cause of cardiac arrest. The signs and symptoms include—

- An uncomfortable pressure, squeezing, fullness, or pain in the center of the chest behind the breastbone. This pain may radiate to the shoulders, neck, and arm, and it may last 2 minutes or longer, or may be intermittent.

- Sweating, nausea, shortness of breath and a feeling of weakness.

13-82. Treatment for Cardiac Arrest

a. *Establish Unresponsiveness.* Gently shake the patient's shoulder and ask "are you okay."

b. *Call for Help.* If the patient is unresponsive, call for help. Even if no one is in sight, call out in the hope that someone will hear.

c. *Position the Patient.* Position the patient in a supine position, if necessary. Cardiopulmonary resuscitation (CPR) cannot be administered in any other position. When positioning the patient, use care to prevent further injuries. Roll the patient over as a unit.

d. *Open the Airway.* Three methods of opening the airway in an unconscious patient are—

- **Head tilt-neck lift method:** Position yourself at the patient's side, place one hand beneath his neck and the other hand on his forehead. Gently lift his neck and at the same time apply backward pressure on his forehead (Figure 13-72).

- **Head tilt-chin lift method:** This technique is used when the head tilt-neck lift method is inadequate to open the airway. Place the fingers of one hand under the lower jaw on the bony part near the chin. Place the other hand on his forehead. Bring the chin forward while lifting so that the teeth are nearly brought together without completely closing the mouth (Figure 13-73).

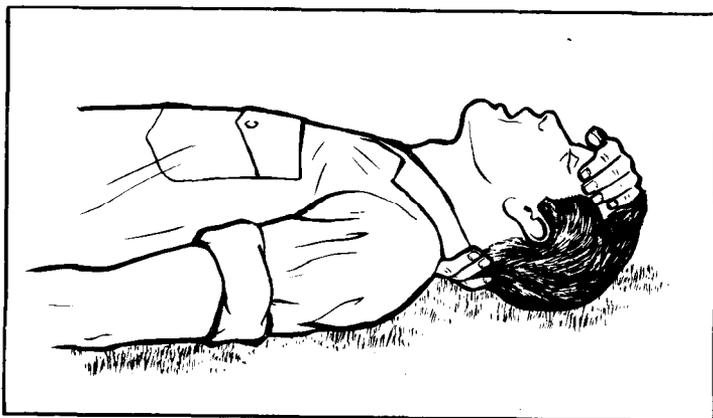


Figure 13-72. Head tilt-neck lift method.

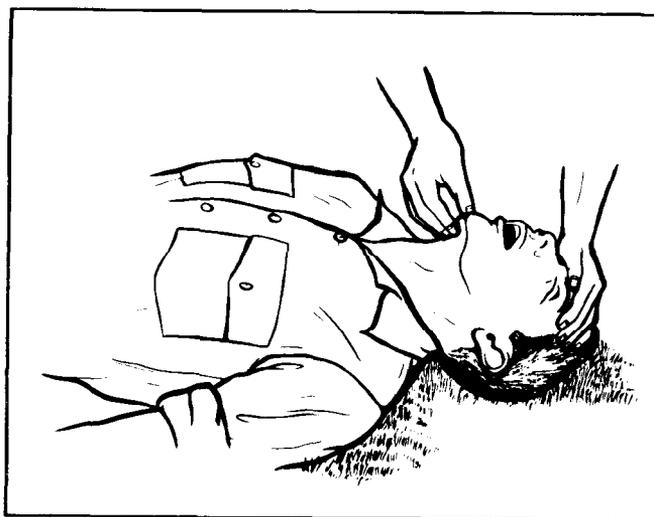


Figure 13-73. Head tilt-chin lift method.

● **Jaw thrust method:** This technique is the safest and first approach to opening the airway of a patient who has a suspected neck injury. In most cases, it can be accomplished without extending the neck. Grasp the angles of the patient's lower jaw and lift with both hands, one on each side, moving the jaw forward. For stability, rest your elbows on the surface on which the patient is lying. If the lips close, gently open his lower lip with your thumb (Figure 13-74).

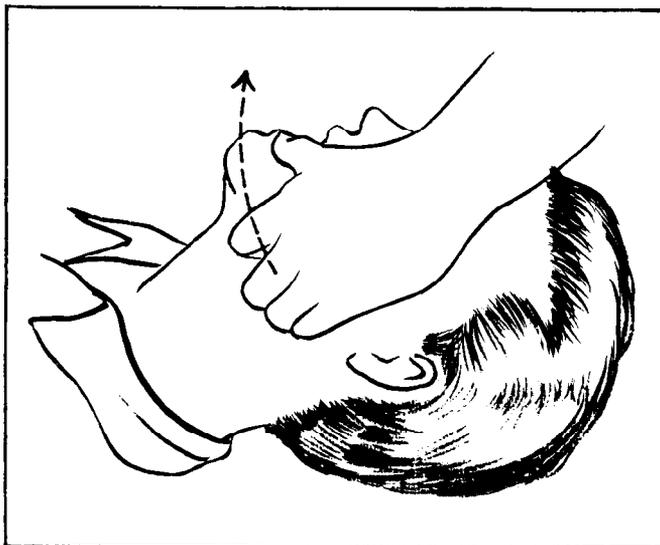


Figure 13-74. Jaw thrust method.

e. Establish Breathlessness. Place your ear over the patient's mouth and nose, look toward his chest and—(Figure 13-75).

- *LOOK* for his chest to rise and fall;
- *LISTEN* for air escaping during exhalation; and
- *FEEL* for the flow of air on your cheek. If the patient is not breathing, you must perform rescue breathing.

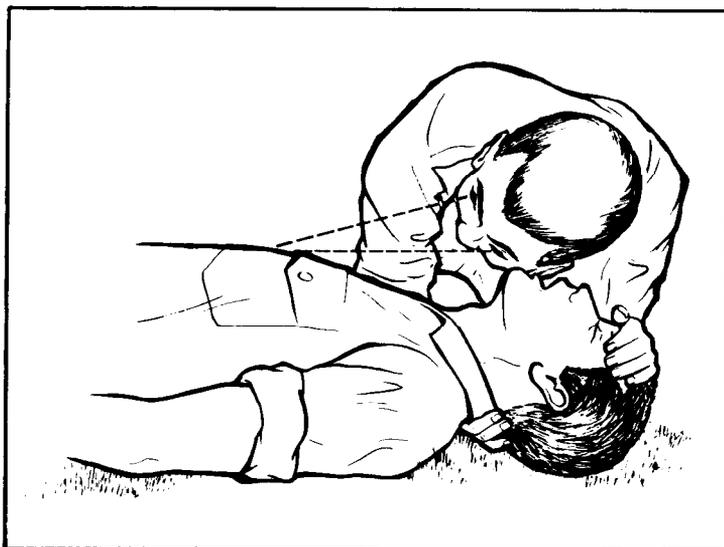


Figure 13-75. Establishing breathlessness.

f. Perform Rescue Breathing.

(1) Use the thumb and index finger of the hand on the patient's forehead to pinch off his nostrils so that air will not escape.

(2) Take a deep breath, open your mouth very wide and place it around the outside of the patient's mouth making a seal.

(3) Blow air into the patient's mouth and at the same time look out of the corner of your eye to see if his chest is rising. If it is, the lungs are being ventilated. Ventilation should only be forceful enough to raise the patient's chest.

(4) Initially give four quick full breaths without allowing time for full lung deflation between breaths. If breathing has stopped, even for a short time, some of the small air sacs of the lungs collapse. Four initial breaths maintain positive pressure in the lungs, thereby, more effectively filling and ventilating the air sacs (Figure 13-76).

(5) If pulse is present but patient is not breathing, you must perform rescue breathing. One breath is given every 5 seconds (for a respiratory rate of 12/minute). Between breaths you must put your head close to the patient's face to look, listen, and feel for spontaneous respirations. The pulse is checked once each minute.



Figure 13-76. Rescue breathing.

g. Establish Pulselessness.

(1) Keep your left hand on the patient's forehead to maintain an open airway.

(2) Place the middle and index finger of your other hand on the patient's adam's apple, then move the fingers down toward the side of his neck (on the side nearest you), locating the carotid pulse (Figure 13-77).

- (3) Use the carotid pulse because it is accessible and reliable.
- (4) **NEVER** use your thumb because you may mistake your own pulse for that of the patient. The thumb has a pulse of its own.



Figure 13-77. Establishing pulselessness.

- (5) If a pulse is not detectable, you must perform external chest compressions.

h. Perform External Chest Compressions.

- (1) With the middle and index finger of your hand nearest the patient's feet, locate the rib cage on the side next to you (Figure 13-78A).
- (2) Move your fingers up along the rib cage to the notch where the ribs meet the sternum in the center of the lower chest (Figure 13-78B).
- (3) With your middle finger on the notch and index finger next to it, place the heel of your other hand next to the index finger on the lower half of the sternum (Figure 13-78C).

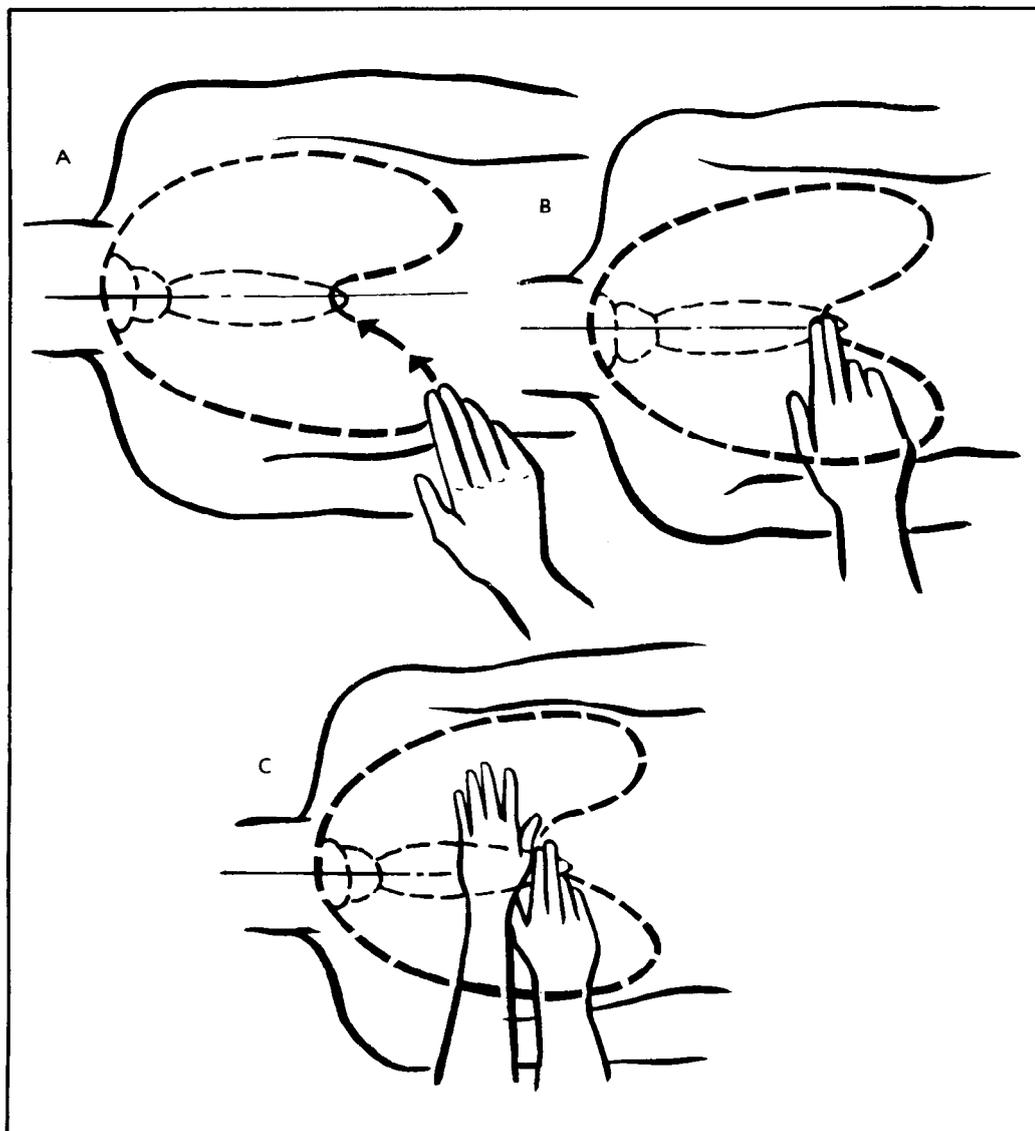


Figure 13-78. Locating hand position on lower sternum.

(4) Move the first hand from the notch and place it on top of the hand that is on the sternum. Keep both hands parallel with your fingers pointing straight away from you. The fingers may be extended or interlaced, but must be kept off the chest (Figure 13-79).

(5) To achieve the most pressure with the least effort, with your arms straight, lean forward until your shoulders are directly over your hands (Figure 13-80). Depress the patient's chest $1\frac{1}{2}$ to 2 inches. Completely release this pressure allowing blood to flow into the heart. Repeat the depressions and release cycles.

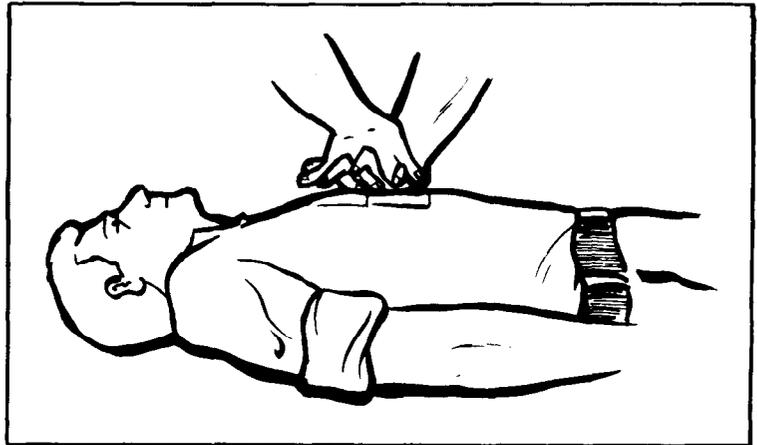


Figure 13-79. Position of both hands and fingers.



Figure 13-80. Chest compressions.

13-83. Perform One Rescuer Cardiopulmonary Resuscitation

a. To provide one rescuer CPR—

- (1) Perform 15 compressions at the rate of 80 compressions per minute. Count one and two and three-----to 15.
- (2) After administering 15 compressions, quickly move to the patient's head, open the airway, and deliver two quick full breaths.
- (3) Move back to the chest, relocate the hand position, and administer 15 compressions.

(4) Repeat this procedure for four cycles.

(5) After administering four cycles of 15 compressions and 2 ventilations, move to the patient's head, locate the carotid artery, and check for a pulse. If no pulse is felt, open the airway, administer two full breaths, and resume CPR.

(6) Check the pulse every few minutes. If a pulse is present, continue rescue breathing only.

b. Sometimes when performing one rescuer CPR, you may be approached by another individual who can assist you. You should begin two rescuer CPR immediately. It is more advantageous to administer two rescuer CPR rather than one because the patient receives more oxygen, the chest compressions are not interrupted, and the problem of rescuer fatigue is lessened. Two rescuer CPR should be performed with one rescuer on each side of the patient.

13-84. Perform Two Rescuer Cardiopulmonary Resuscitation

a. Changing to two rescuer CPR should be performed without interruption.

(1) The second rescuer identifies and positions himself on the opposite side of the patient next to his head.

(2) The second rescuer locates the carotid artery and checks for a pulse while the first rescuer is performing chest compressions (if compressions are being done correctly, a mechanical pulse should be felt).

(3) The second rescuer informs the first rescuer to stop chest compressions while he continues to monitor for a spontaneous pulse or respiration. First rescuer maintains his hand position.

(4) If no pulse or respiration is felt, the second rescuer interposes two breaths and informs the first rescuer of his findings and advises him to continue compressions.

(5) The rate of compressions for two rescuer CPR is 60 per minute. This is accomplished by the first rescuer counting one-one thousand, two-one thousand, three-one thousand, four-one thousand, five-one thousand, one-one thousand, and so on.

(6) After every fifth compression, the second rescuer interposes one breath. The ratio of compression to ventilation for two rescuer CPR is 5:1. Administer the ventilation on the UPSTROKE of the fifth compression. The rescuer performing the compressions does not stop to allow for the ventilation. The transition from five-one thousand back to one-one thousand should be smooth without any interruption. A pulse check should be made after the first minute (12 cycles) of two rescuer CPR and then every 3 to 4 minutes or when the rescuers change positions.

b. Changing position is essential in preventing fatigue.

(1) The first rescuer informs the second rescuer when he is ready to change by substituting the count of one-one thousand with change-one thousand, two-one thousand, and so on.

(2) On the upstroke of the fifth compression, the second rescuer administers one breath and changes position with the first rescuer.

(3) The first rescuer moves to the patient's head and assumes the role of the second rescuer. He locates the carotid pulse and checks it for 5 seconds. While this is being done, the second rescuer who has now assumed the role of the first rescuer finds the correct hand placement and waits for the rescuer at the head to check for a pulse and respiration. If neither is present, he administers two full breaths and informs the first rescuer to continue compressions. The procedure of two rescuer CPR is then resumed and not interrupted again until a change is necessary.

c. CPR should never be interrupted for more than 5 seconds and should only be terminated for the following reasons:

- The patient revives.
- The patient is pronounced dead by a physician.
- The rescuer(s) is/are relieved.
- The rescuer(s) becomes exhausted and unable to perform CPR.

Section X. UPPER AIRWAY OBSTRUCTIONS

13-85. General

Most upper airway obstructions are caused by large pieces of meat. However, a variety of foreign bodies have been the cause of obstructions. Obstructions may be either partial or complete. The individual with a partial obstruction may have a good air exchange. With a good air exchange, the patient can cough forcefully; however, it is common to have wheezing between coughs. Encourage the patient to continue coughing. Never attempt to interfere with his efforts to dislodge the foreign substance. A poor air exchange is usually indicated by high-pitched noises when inhaling and weak, ineffective coughing, with increased difficulty in breathing accompanied by cyanosis (bluish color of skin and fingernail beds). Partial obstructions with poor air exchange are treated as though they are a complete airway obstruction. A patient with a complete airway obstruction is unable to speak, breathe, or cough. He will have an absence of air movement and requires immediate assistance.

13-86. Signs of a Airway Obstructions

- a. Signs of a complete airway obstruction in a conscious patient.
- Grasping his throat (Figure 13-81).
 - Unable to speak.
 - Unable to cough or breathe.
- b. Signs of a partial airway obstruction in a conscious patient.
- Wheezing between coughs.
 - High-pitched noise when inhaling.
 - Weak, ineffective coughing.
 - Increased difficulty in breathing.
 - Unable to breathe.

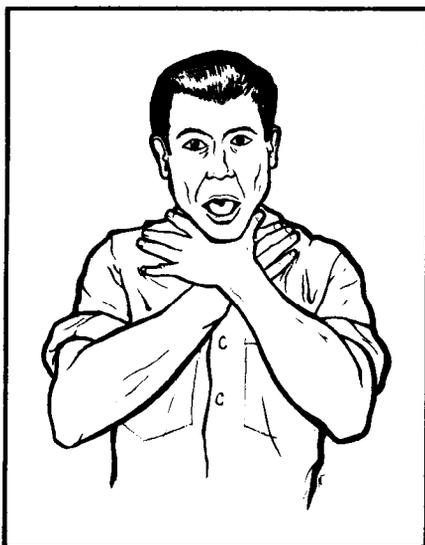


Figure 13-81. Patient grasping his throat.

13-87. Treatment for an Airway Obstruction in a Conscious Patient

- a. Apply back blows.

- (1) Place yourself to the side and slightly behind the sitting or standing patient.
- (2) Place one hand over his sternum for support.

(3) Bend the patient at the waist while providing support with your hand at his sternum and deliver four sharp blows with your other hand in rapid succession between his shoulder blades (Figure 13-82).

(4) If the obstruction is not cleared, apply the abdominal thrust as described below.

CAUTION

Never use back blows for patients' with fractures or suspected fractures of the neck. Only use abdominal thrust for these patients.

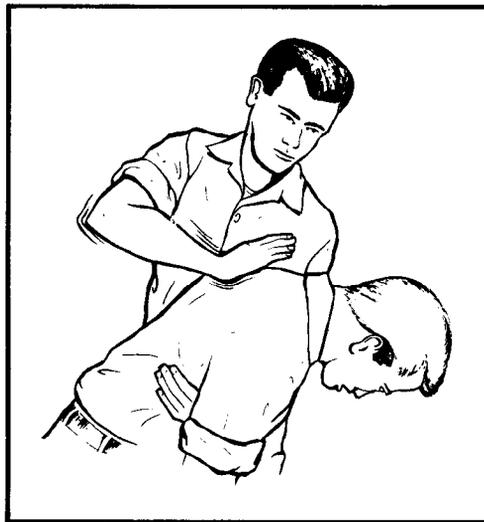


Figure 13-82. Back blows.

b. Apply abdominal thrust.

(1) Stand behind the standing or sitting patient and wrap your arms around his waist.

(2) Make a fist with one hand and grasp the closed hand with your other hand. Place the thumb side of your fist against the patient's abdomen between the umbilicus and xiphoid process (bottom tip of the sternum) (Figure 13-83).

(3) Press your fist into the patient's abdomen four times with quick inward and upward thrusts.

NOTE

NEVER place your fist on the xiphoid process or the lower margin of the rib cage. Pressure on either of these areas can fracture the sternum or ribs, which may puncture the lungs.



Figure 13-83. Abdominal thrust.

c. Apply chest thrust (alternate method used on obese or pregnant patients, or patients with abdominal wounds).

- (1) Stand behind the sitting or standing patient.
- (2) Place your arms directly under the patient's armpits and encircle his chest.
- (3) Place the thumb side of your fist on the CENTER of his sternum.
- (4) Grasp your fist with your other hand and exert four quick backward thrusts (Figure 13-84).

NOTE

Back blows and manual thrusts are repeated until the obstruction is dislodged, or until advanced medical treatment is begun.

d. If the patient loses consciousness, follow the procedures outlined in clearing an obstructed airway in the unconscious patient.



Figure 13-84. Chest thrust.

13-88. Treatment for an Airway Obstruction in an Unconscious Patient

a. Ventilate the patient.

- (1) Establish unconsciousness and call for help.
- (2) Open the airway and use the "Look, Listen, and Feel" procedures to establish breathlessness.
- (3) If no respirations are noted, perform rescue breathing by giving four quick breaths.
- (4) If unable to ventilate the patient, reposition his head and attempt to ventilate again.

b. If you are unable to ventilate the patient, apply back blows.

- (1) Kneel and roll the patient onto his side with his chest against your thigh.
- (2) Deliver four sharp blows to the patient's back between his shoulder blades (Figure 13-85).

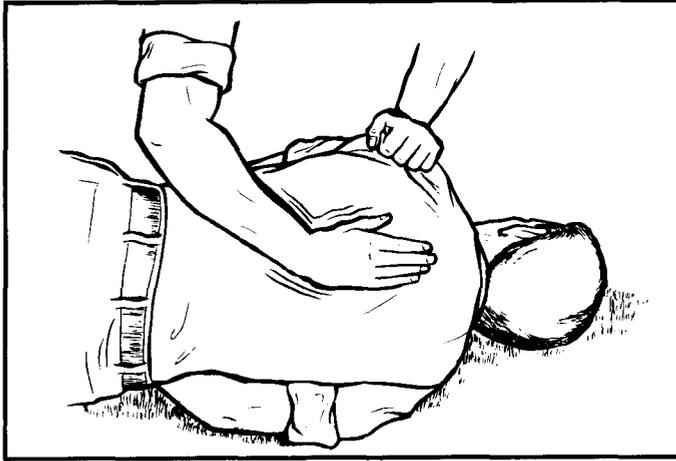


Figure 13-85. Applying back blows.

c. If unsuccessful, apply abdominal thrusts.

- (1) Position the patient on his back and kneel beside him with your knees close to his hips or straddle him (Figure 13-86).
- (2) Open his airway and turn his head to one side.
- (3) Place the heel of your dominant hand against the patient's abdomen, in the middle between the xyphoid process and umbilicus (Figure 13-86).
- (4) Move forward so that your shoulders are directly over the patient's abdomen.
- (5) Press down on his abdomen with four quick inward and upward thrusts. Do not press to either side.

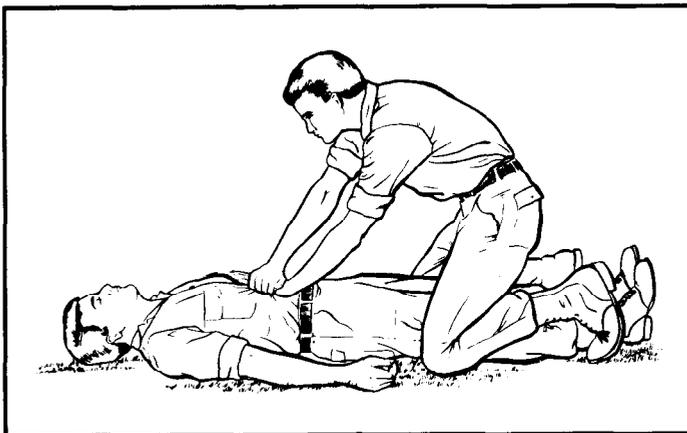


Figure 13-86. Abdominal thrusts (unconscious patient).

d. Apply chest thrust (alternative method used on obese or pregnant patients or patient with abdominal wounds).

- (1) Place the patient on his back and kneel close to his side.
- (2) Open the patient's mouth and turn his head to one side.
- (3) Place your hands on the lower half of his sternum as you do in performing CPR.
- (4) Exert four quick downward thrusts that compress his chest 1 1/2 to 2 inches as in CPR.

e. Apply finger sweep.

(1) With the patient's head up, open his mouth by grasping both his tongue and lower jaw between your thumb and fingers and lifting (tongue-jaw lift) (Figure 13-87). If you are unable to open his mouth, cross your finger and thumb (crossed-finger method) and push his teeth apart (Figure 13-88).

(2) Insert the index finger of your other hand down along the inside of his cheek to the base of the tongue.

(3) Use a hooking motion to dislodge the foreign body from the mouth (Figure 13-89).

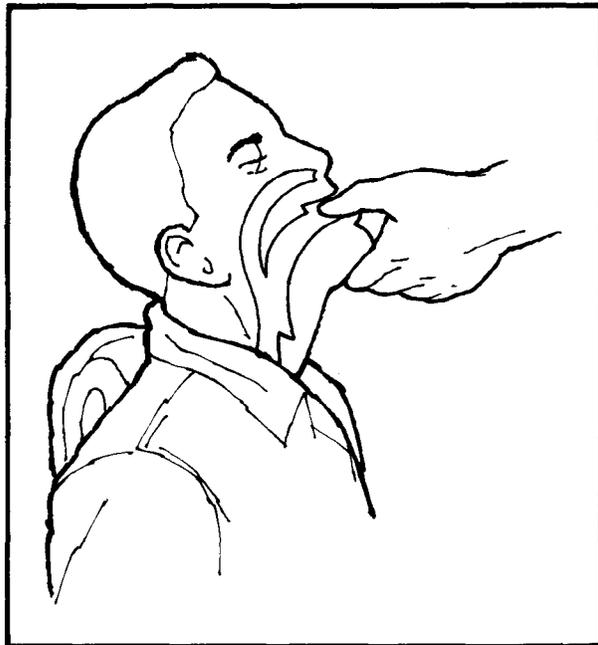


Figure 13-87. Opening the patient's mouth (tongue jaw lift).



Figure 13-88. Opening the patient's mouth (crossed-finger method).

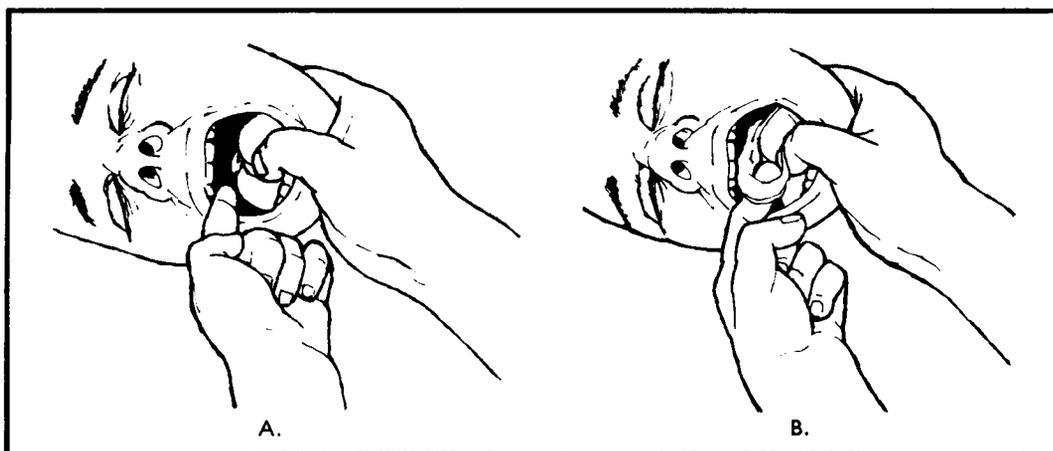


Figure 13-89. Using finger to dislodge foreign body.

NOTES

1. If a foreign body can be seen in the mouth, remove it with the fingers. If it cannot be seen, use a combination of back blows and manual thrusts to expel or dislodge it. Then remove it with the fingers.
2. Do not force the object deeper into the airway.

f. Attempt to ventilate the patient.

- If unable to ventilate the patient, repeat back blows, manual thrusts, and attempts to ventilate as often as necessary until the airway is cleared of the obstruction.

- If able to ventilate, perform rescue breathing (if patient has no spontaneous respirations).

g. Record treatment.

h. Evacuate patient, if necessary.

Section XI. MANAGEMENT OF CHEST INJURIES

13-89. General

Open chest injuries can be the result of many causes, but are *always* serious. Unless treated rapidly and correctly, the injury can cause permanent damage to the brain and nervous system. All penetrating chest wounds are treated as if they are sucking chest wounds; even though penetrating wounds in the thorax usually seal themselves. An opening in the chest wall that is approximately 2/3 the diameter of the trachea will severely compromise respirations.

13-90. Signs and Symptoms of an Open Chest Wound

- A "sucking" or "hissing" sound, produced whenever the patient inhales.

- Breathing difficulty.
- A puncture wound of the chest.
- An impaled object protruding from the chest.
- Froth or bubbles around the injury site.
- Coughing up frothy, bright red blood.
- Pain in the chest.
- Pain in the shoulder.

13-91. Treatment for an Open Chest Wound

- a. Expose the wound by unfastening or cutting clothing away.

CAUTION

In a chemically contaminated environment immediately mask the patient (if not already masked) and quickly apply a dressing. Do not remove his clothing.

b. Examine the patient for an exit wound. Carefully palpate and/or visually examine the patient's chest and back to determine the presence and location of any exit wounds.

c. Treat the larger wound first.

d. Place an occlusive dressing on the chest wound.

(1) Cut the two short edges and one long edge of the field first aid dressing plastic outer wrapper and remove the contents.

NOTE

Vaseline gauze can be used, when available, for the initial dressing instead of the plastic wrapper. It can be covered by the sterile side of its plastic or foil wrapper.

(2) Open the wrapper carefully, touching only the edges. Apply the inner surface to the wound to provide a sterile covering (Figure 13-90). The covering should be large enough to extend two or more inches beyond the edges of the wound.



Figure 13-90. Applying occlusive dressing.

NOTE

In an emergency, use anything that can cover the wound and block air entrance.

(3) Tape the dressing on three sides to provide a flutter-type valve. As the patient breathes in, the dressing is sucked over the wound preventing air from entering. When the patient exhales, the open end of the dressing allows air to escape. Securely taping all edges of the dressing can cause a build up of air within the thoracic cavity and result in a tension pneumothorax.

NOTE

The bandage may be tied over the wound using a field first aid dressing, cravat, or other material if tape is not available.

e. Dress the wound by placing a field first aid dressing over the three-sided dressing and tie the dressing ends (tails) on the edge of the dressing loosely so as not to interfere with the flutter valve effect of the three-sided dressing (Figure 13-91). The purpose of the field dressing is to protect the wound and absorb secretions.



Figure 13-91. Applying a field first aid dressing.

CAUTION

Bandages tied tightly around the patient's chest can interfere with his ability to breathe.

f. Place the patient on his injured side to aid in the maintenance of an open airway (Figure 13-92). This position allows the good lung to function properly. It also prevents the collection of fluids in the chest cavity.

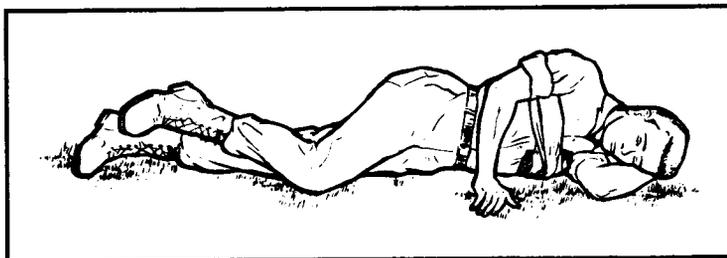


Figure 13-92. Patient on injured side.

- g.* Monitor the patient closely to maintain an open airway and a good seal on the wound.
- h.* Record treatment.
- i.* Evacuate the patient.

13-92. Closed Chest Wounds

a. The various types of closed chest injuries almost uniformly require the same initial care. The most important immediate consideration in any chest injury is to establish and maintain an open airway.

b. Fractured ribs result from direct blows and compression injuries to the chest. The ribs most often fractured are the fifth through the ninth. The first four ribs are rarely fractured because they are protected by the shoulder girdle. The lower (floating) ribs (11 and 12) are attached only to the spine and have a greater freedom of movement (Figure 13-93).

c. The most serious injury resulting from rib fractures is the "flail chest." This occurs when three or more ribs are fractured in two places or the sternum (breastbone) is fractured. The portion of the chest wall that is left unsupported by the fractured ribs causes paradoxical breathing (the reverse of normal respiration). That is, when the patient inhales, his chest moves inward. When he exhales, his chest moves outward. The lung under the fracture site does not expand because of the chest being sucked in during inspiration. This decreases the patient's oxygen intake.

d. Complications that can arise from closed chest injuries are—

- Pneumothorax—an accumulation of air in the chest cavity, but outside the lung (a fractured rib lacerating the lung).

- Spontaneous pneumothorax—due to the rupture of a bleb (blister) on the surface of the lung. A large bleb increases the possibility of a tension pneumothorax.

- Tension pneumothorax—a condition in which air enters the chest cavity through a hole in the lung which acts as a one-way valve. This valve allows air to enter the pleural space continuously, but not to leave the chest cavity. The increased pressure in the chest causes the lung to collapse but does not seal the hole in the lung. As the pressure on the affected side

continues to rise, the collapsed lung is pressed against the heart and opposite lung. This causes a mediastinal shift of the larynx, trachea, and heart toward the unaffected side. The uninjured lung is now mechanically compressed. As pressure in the chest cavity rises, it may cause the great vessels to become twisted or kinked and compromise or occlude the circulation. Blood can no longer be pumped from or return to the heart and death results rapidly. Definite signs of a tension pneumothorax are—

- o Severe respiratory distress.
- o Weak pulse and lower blood pressure.
- o Bulging of the tissue between the ribs and above the clavicle.
- o Distension of the veins in the neck.
- o Tracheal deviation away from the affected side.
- o Mediastinal shift away from affected side.

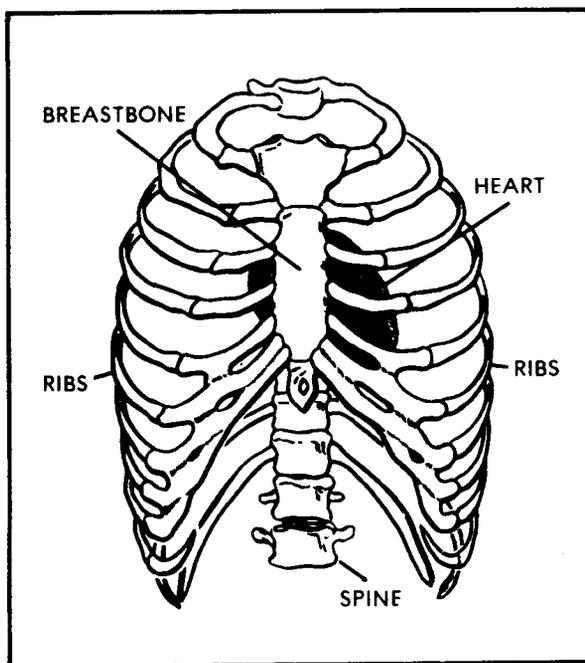


Figure 13-93. Rib cage.

● Hemothorax—an accumulation of blood in the chest cavity, but outside the lung. A hemothorax will frequently accompany a pneumothorax. The bleeding may come from lacerated vessels in the chest wall or lacerated major vessels in the chest cavity itself.

- Pulmonary contusion (lung bruise)—results from blunt injuries to the chest. This type of complication will react like a bruise to any other part of the body. Blood vessels in the lungs are injured and a considerable amount of blood is lost into the lung. The patient may or may not have respiratory distress.

- Rupture of major vessels—occurs within the chest cavity (superior and inferior vena cava, pulmonary arteries and veins, and the aorta). Injuries to any of these vessels may result in massive hemorrhage. Any patient in shock with evidence of a chest injury should be suspected of having injured one of the major vessels.

13-93. Signs and Symptoms of a Closed Chest Injury

- Pain at the site of the injury.
- Pleuritic pain—pain that is increased by or occurs with respirations. It is localized around the injury site.
- Hypoxia—low oxygen content in the blood.
- Dyspnea—shortness of breath or difficult breathing.
- Cyanosis—bluish color of the lips, fingertips, or fingernail beds.
- Subcutaneous emphysema—air in the subcutaneous tissue of the neck and chest.
- A rapid, weak pulse with low blood pressure—possible shock.
- Hemoptysis—coughing up blood or blood-tinged sputum.
- Failure of one or both sides of the chest to expand normally and equally on inspiration.

13-94. Treatment for Closed Chest Injuries

a. Simple rib fracture.

(1) Bind the patient's arms to his chest by using three cravats (Figure 13-94).

(2) Encourage the patient to take deep breaths to inflate his lungs. This will prevent hypoxemia and atelectasis (collapsed alveoli) by increasing the air volume and pressure in the alveoli (air sacs) of the lungs.

- (3) Administer oxygen (if available).
- (4) Record treatment.
- (5) Evacuate patient.

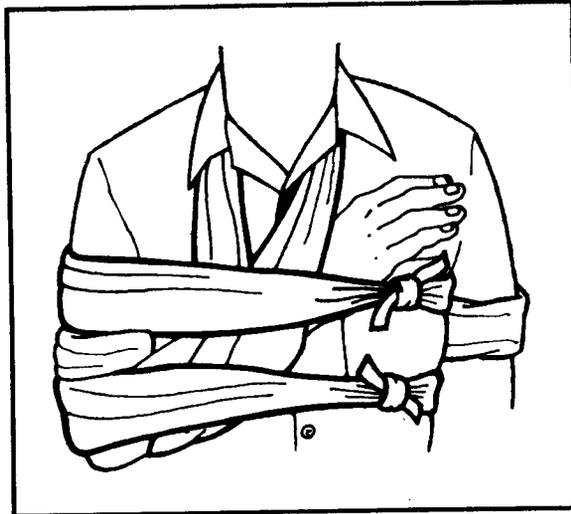


Figure 13-94. Binding a patient's broken rib.

NOTE

When binding a patient's arm to his chest, do not apply the cravats so tightly that they interfere with his breathing.

b. Flail chest.

- (1) Establish the airway.
- (2) Administer oxygen (if available).
- (3) Assist the patient's respiration by using a Bag-Valve-Mask System, if available, or administer mouth-to-mouth or mouth-to-nose resuscitation (if necessary).

CAUTION

When administering assisted ventilation, monitor the patient closely for signs of a pneumothorax. Positive pressure breathing can worsen a pneumothorax or convert it into a tension pneumothorax.

- (4) If a tension pneumothorax is suspected and the patient is cyanotic or manifests signs of cardiovascular compromise (frank hypotension—cold clammy skin), insert an 18 or 16 gauge needle into the chest cavity to decompress the pleural space (Figure 13-95). Slowly insert the needle in the second or third intercostal space at the mid-clavicular line until a "hiss" of air is heard. *Get your ear down there and listen!* Secure the needle to the patient and place a flutter valve, or improvised valve (cut finger of a rubber glove), over the end of the needle (Figure 13-96). The most experienced medical person available should perform this procedure.

CAUTION

Do not insert the needle on the underside of the superior rib. All of the blood vessels and nerves are in this area.

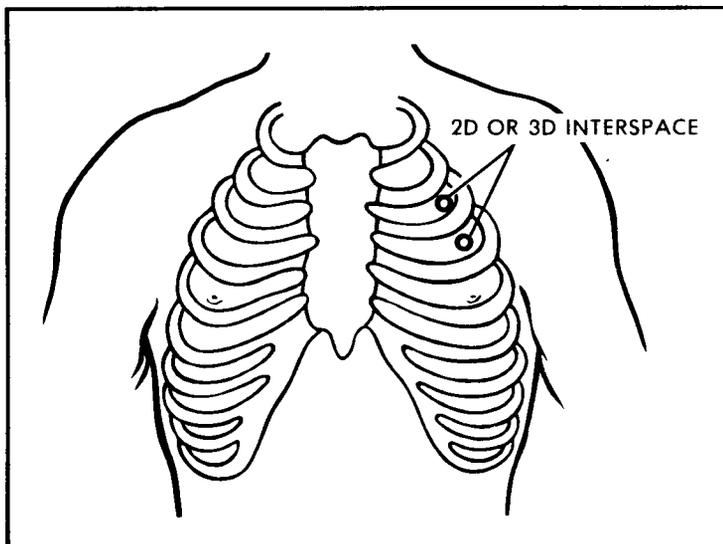


Figure 13-95. Needle insertion sites for tension pneumothorax.

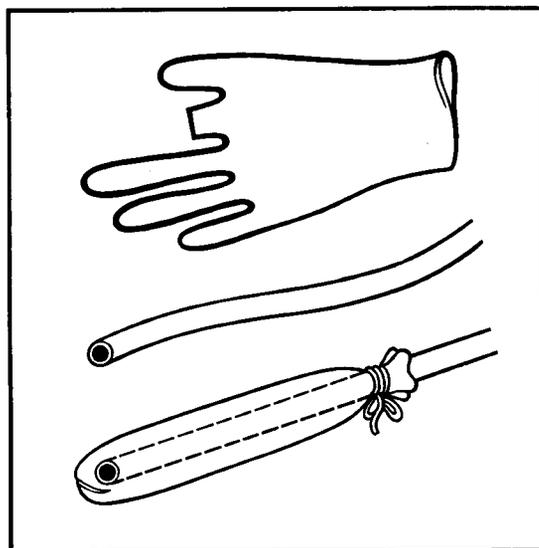


Figure 13-96. Improvised flutter valve.

- (5) Start an intravenous infusion at TKO rate (if available).
- (6) Stabilize the flail segment (Figure 13-97).

- (7) Apply constant firm manual pressure by using sandbags, pillows, a folded blanket, a field jacket, or a poncho.
- (8) Tape the pressure material in place with strips of tape.
- (9) Have patient lie on the injured side.

NOTE

The chest should not be wrapped or taped around its diameter. This limits the ability of the chest to expand and increases breathing difficulties.

- c. Treat patient for shock (if necessary).
- d. Record treatment.
- e. Evacuate the patient.

CAUTION

A patient with a pneumothorax who is to be evacuated by helicopter should have a flutter valve in place. This is to allow the air to escape that may accumulate in the chest cavity with atmospheric pressure changes. If a flutter valve is not in place, the aircraft should be flown as low as safety and the tactical situation permits. Closely monitor the patient.

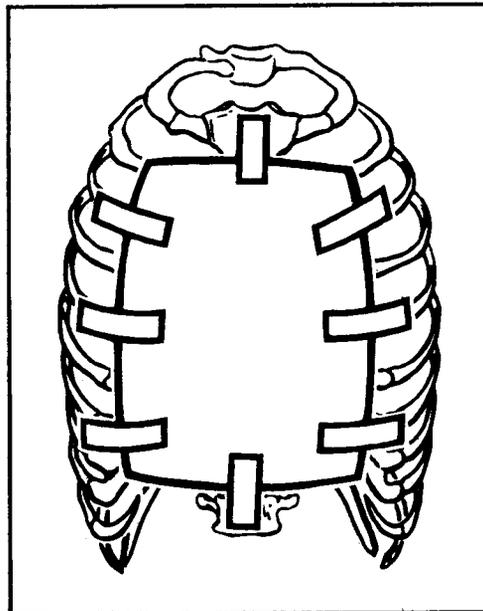


Figure 13-97. Stabilized flail chest.