

FIELD MANUAL

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THE AIDMAN'S MEDICAL GUIDE

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

This manual is intended primarily for you, the medical aidman in the field. It tells you what to do with the supplies and equipment that you can carry and can use without hot or running water or electrical power. It also tells you how to protect yourself and your patients. The first eight chapters of this manual deal primarily with trauma: injuries and wounds. The last nine chapters of the manual deal essentially with medical diseases. Your comments to improve this manual will be welcomed. Send them direct to Commandant, ATTN: MEDEW-ZNT, US Army Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas 78234.

1-2. Definitions

Self aid, first aid, and buddy aid are emergency medical procedures carried out by anyone, whether trained or untrained in medicine. *Emergency medical care* is early care given by trained medical personnel. *Definitive medical treatment* is that specialized care of the sick and wounded given by highly trained medical personnel, ordinarily the doctor. The steps taken by individuals in these different treatments may be the same, with only the equipment and application differing.

1-3. Your Resources

In the field, you can give emergency medical treatment but you do so with limited resources. Your physical resources are limited by two things: the tactical situation and how much you can carry. You are trained to improvise in some situations, and to request assistance in others.

1-4. Your Main Job

In addition to lifesaving and first aid measures, disposition of patients is your job. When a soldier is wounded, or when you are faced with a medical problem, ask yourself, "Should I evacuate this man or treat him here?" Often, the tactical situation and

the nature of the man's illness or injuries require *you* to treat him. This manual tells you *how* to treat him.

1-5. Dealing With Your Fellow Troopers

The personal relationship between you and the troops you support is very important. If you command the confidence and respect of the troops, you can do a far better job of treating them. At first, you earn their confidence and respect by how well you conduct yourself in everyday dealings with them, not by treating patients in combat. The aidman who is accepted by his troops is known to them as "Doc." Such a nickname implies you have the respect and trust of the men you serve. To get this you have to be more than a skilled medic. You have to be always willing to help a trooper any way you can.

1-6. What a Good Aidman Does

a. Most of your time is spent, not in combat and treating patients, but in waiting. While waiting, you care for your equipment and replenish your supplies, but equally important you talk with the troops. You are the ever-present advisor on their *minor medical problems* and the *minor medical problems* of their families at home. Often a soldier concerned about the medical problem of someone in his family comes to you for information. You are not expected to have the answer to every question. Yet if you are attentive, sympathetic, and honest with the soldier, you will be remembered kindly.

b. You must do your share of the hard work. You cannot afford to be known as a "goof-off." You are expected to defend yourself and your patients when necessary. You are not supposed to carry a radio or parts of crew-served weapons, but do not hesitate to help a fellow soldier carry a heavy load when you are not in contact with the enemy.

c. Besides doing your share of the work, you will always look out for the welfare of your troops. Before the unit goes on a mission, check out each man. If you find a soldier with a medical problem, go to the platoon sergeant and tell him the man's condition, capabilities, and limitations. During the mission, observe each man. If you get to know the men well, you can tell quicker when one is getting sick. You can anticipate many medical problems. For example, if you know the troops are on short water rations in hot weather, you might anticipate a case of heat exhaustion. Some water from your canteen may prevent it. (You may carry an extra canteen of water to help eliminate this situation.)

d. At the end of the mission, check each soldier again to see if any are sick or hurt. Some will get minor wounds but not com-

plain about them. In checking out the men, explain the danger of infection to them. Take every opportunity to encourage preventive measures, such as foot inspections, especially after a long, hot march.

e. During rest periods and between missions, you should make sure all minor medical problems are settled. You may want to go with a trooper on sick call and learn from the medical officer the best way to continue treating him. If medication is prescribed, you should be certain it is taken correctly. All the time, you should support your troops when medical problems are involved. If you do, they will respect and support you.

1-7. Preoperational Briefings

Commanders usually include medical personnel in briefings before a mission. If you are not included, find out all you can after briefings. The more you know about the mission and its likely medical hazards, the better you can do your work. When altered for a mission, go to the platoon sergeant or the platoon leader and ask about it. Find out how far the men are going, how many are going, how long they will be away, and how much enemy action is expected. Then you can decide what supplies to take.

1-8. Tools and Equipment

On a combat mission you carry only the supplies you *need* and know how to use, not what is *nice* to have. You are responsible for your aid bag, water, weapon, and ammunition. The weapon may be one of a type that is organic to the unit you support or it may be the one the tactical commander thinks best for you.

1-9. Your Aid Bag

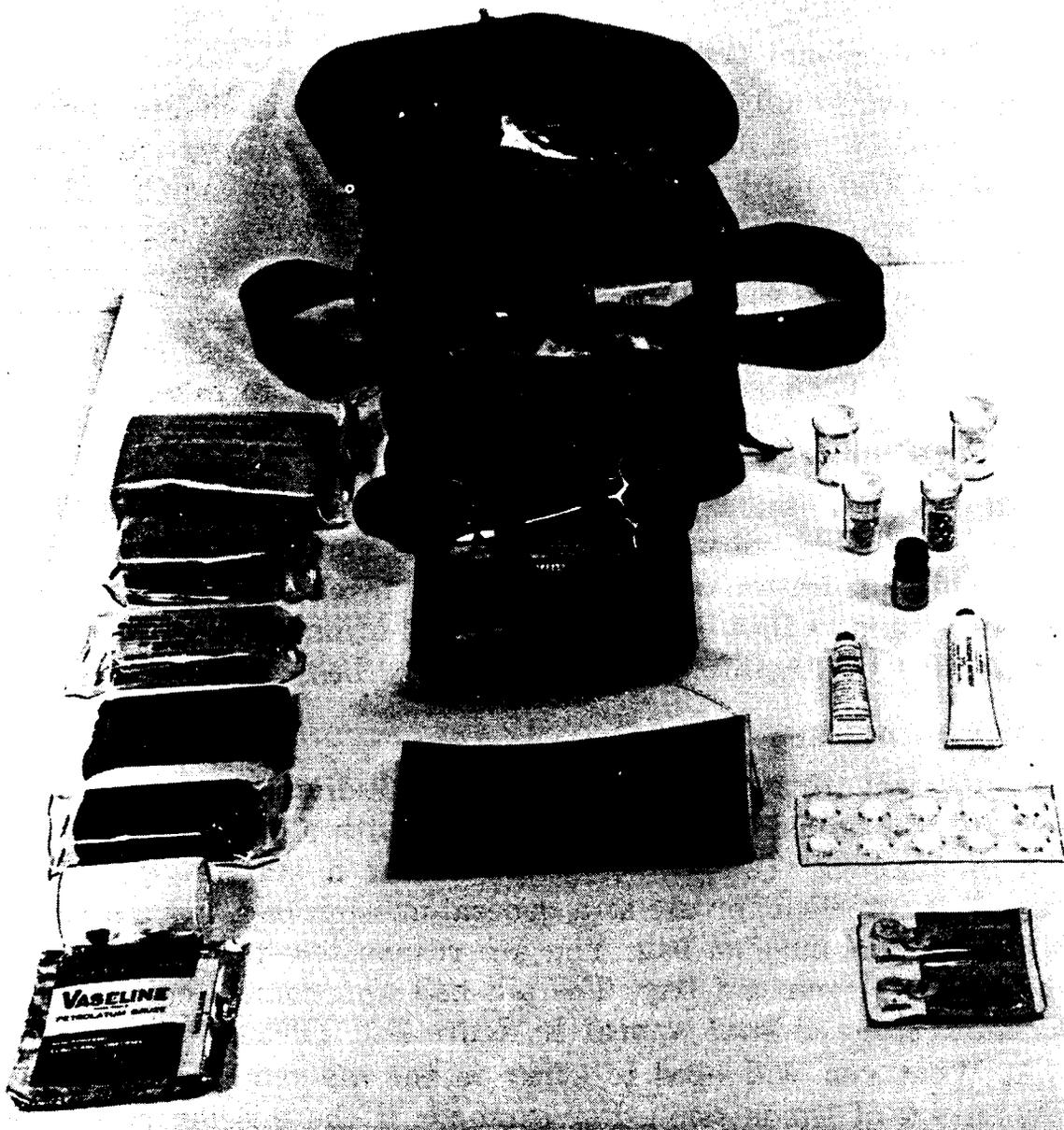
The surgical instrument and supply set, individual, is a general use aid bag issued by the medical depot with a standard packing list of supplies. This standard aid bag is a starting point for you. It is intended for use as a general-mission bag, not a special-mission or all-mission bag. You are responsible for packing and maintaining your aid bag. The aid bag and some items carried by an average aidman appear in figure 1-1. (See also chap. 18.)

a. What you will need to carry in the aid bag depends upon the nature of the mission. For example, if the mission is to be a walk to and a look around a village, lasting about 2 hours and taking 15 men, with no enemy action expected, you would take a light bag of supplies. If the mission is to go several miles away, taking 40 men and setting up a night ambush, with enemy action expected, you would take a different bag of supplies. If the company is going on an extended mission, you would take still another aid bag.

b. As your knowledge and experience increase, you will change items in your aid bag. Some items, like field dressings, bandages, and aspirins, should always be included while others, like antibiotics, should not be taken to the field without permission of the medical commander. Contents of aid bags also vary with the area of operations, local policy, and supplies available.

1-10. Steps in Solving Medical Problems

a. Get a history and do a rapid physical examination of a patient. For example, without asking needless questions, find out



DRESSINGS, BANDAGES, VASELINE GAUZE, INSTRUMENT SET, FIELD MEDICAL CARDS, SALT TABLETS, ASPIRIN, ANTI-MALARIAL TABLETS, ANTIHISTAMINE, WATER PURIFICATION TABLETS, BACITRACIN OINTMENT, TETRACAINE OINTMENT, GELUSIL, COUGH LOZENGES.

Figure 1-1. Surgical instrument and supply set, individual (aid bag), with typical contents.

whether the wound was caused by a bullet, a mortar round, a booby trap, or a fall from a vehicle. If it is a perforating wound, see if it has caused more than two holes. Determine the number of wounds. Find out if there is severe hemorrhage, internal bleeding, or a broken bone(s). Quickly assess the vital signs (pulse, blood pressure, respiration) to determine whether the patient's life is in danger.

b. Make a judgment or a tentative diagnosis. For example, if the wound is serious, will the patient die soon without definitive medical treatment? If the wound is not serious, can he continue his mission with some treatment? What is the tactical situation? How much time do you have? How much help can you get?

c. Take some positive action.

(1) Get yourself and the patient in the safest position consistent with his injuries and the tactical situation.

(2) Clear the airway and give artificial respiration if necessary. Control hemorrhage as quickly as possible. Treat for shock if necessary.

(3) Ask for assistance. Move the patient to a safer place and request evacuation if indicated.

(4) Reassure the patient. Positive action will reassure him more than anything you can say to him.

d. For guidance in handling a medical problem beyond your capability, you may be able to go through communications. Most of the time the operator can connect you with a medical officer or other medical personnel who can tell you how to handle the problem. They can also dispatch personnel and equipment to help you.

CHAPTER 2

TACTICS FOR THE AIDMAN

2-1. Staying Alive and Well

When you go into combat, staying alive and well is mostly a matter of training, not luck. If you become so engrossed in any activity that you forget the lessons of basic combat training, it could be fatal. Other valuable points on tactics are found in FM 8-22, *The Combat Medic*.

2-2. Who is Your Boss?

You may wonder who your boss is, or whose orders you follow. The commander of the element you are supporting has operational control over you. He will tell you what you are to do to medically support his element and when and how he wants it done. The medical platoon/section/leader handles your administrative matters as well as technical supervision of your work. If you are concerned about your pay, leave, promotion orders or assignment orders, you should go through your command channels for assistance or information.

2-3. Where You Work

Where you are located in the platoon will depend upon the desires of the element commander. He must know where you are at all times. The most likely location for you is at or near the command post. That is normally where the communications are placed. You should be close to the communications but not so close that you become a target for snipers. If you have to leave this position, you must inform the commander. You should be where you are readily accessible to expected patients and where your men know they can find you. The commander may direct you to other positions depending on the situation. During night operations, especially during total darkness or stake outs, remain at a fixed location and move only on orders. You can easily be mistaken for infiltrating enemy if you wander around during darkness.

2-4. Working Under Fire

There are several things you should do if your element comes under attack. Hit the ground quickly. Look for a signal from the

tactical commander. Move to a safer position as soon as there is a break in the firing from the enemy. Look again for a signal from the tactical commander. If there is no signal from the commander, remain low and in as safe a position as possible. Get your aid bag in position. If someone is hit and calls for a medic, do not run out to him immediately. Ask the commander for a signal to move. If you cannot see the commander, be sure to tell someone to cover you while you move out. The "stay alive" rule is: be sure you are covered before you move out to render aid to a patient. Also remember that a single round going off usually indicates a sniper is doing the shooting. Do not run to the assistance of a man hit by sniper fire. You cannot always see the sniper. Usually he can see you and will shoot you as soon as you move into his line of sight. So, wait until the sniper is located and disposed of, or wait for a signal from the commander before moving out. Do not run immediately to assist a booby trap casualty. Allow the booby trap experts to escort you to him. Booby traps are often placed in clusters. Without expert help you too can get hurt by one. There are many rules of combat. You should learn as much as you can from the experts. If not, you may learn these rules the hard way.

2-5. Resupply on Missions

While you are out on a mission you can get medical resupply through medical evacuation channels. If you need specific items of equipment, they can be delivered by any available means. As a rule, it is best to request medical resupply at the same time that you request medical evacuation. The medical evacuation vehicles are manned by medical personnel who are knowledgeable and have quicker access to medical supplies and equipment than other personnel.

2-6. Evacuation Plan

a. You should become familiar with the evacuation plan before starting on a mission. The evacuation plan is dictated by the tactical situation. Normally, a general evacuation plan is announced by the tactical command after consultation with the surgeon. In his planning and briefing for each mission, the tactical commander will describe the plan for the particular mission. Only the tactical commander or element commander is fully aware of the tactical situation. Therefore, only he can state what the evacuation plan is at any given time. If the element commander denies your request for evacuation, accept his decision. Besides knowing the tactical situation, he is responsible for everybody, not just the patients.

b. You never order an evacuation. Instead, you request it through the tactical commander. When you decide an evacuation is

needed, contact the command post and describe the patient's condition. After discussion of the situation, the commander will usually make the final decision about evacuation. Safe arrival and departure of the evacuation vehicle is his responsibility. He decides if it would be tactically sound to allow a vehicle into his area of operations then. If he denies your request, you have to do the best you can for the patient commensurate with the tactical situation.

2-7. Requesting Evacuation

a. You must prepare for the disposition (evacuation) of the patient after you have initiated lifesaving emergency treatment. You should concentrate on stabilizing his condition, as time and the tactical situation allow, before the evacuation vehicle arrives.

b. Determine evacuation categories of precedence and make your request. Categories of precedence for evacuation may change with the tactical situation. They dictate who is treated, when he is treated and by whom, and how, when, and where he is to be evacuated. In addition to the tactical situation, you must consider (in requesting evacuation) the nature of the wound or illness, the type of transportation available, and the medical treatment facility available. A critically injured patient should be evacuated as rapidly as possible to a clearing station or hospital for example. On the other hand, a patient with a foreign object in his ear is not urgent and probably can be treated at an aid station.

2-8. Categories of Precedence for Evacuation

Although your primary concern is with the patient's welfare, you have a responsibility to other troopers in the company. You should not endanger them by requesting needless evacuation. Yet, you must not let the patient die because of your failure to request proper evacuation. You should be guided by the nature of the wound or illness in determining which category to assign in the request for evacuation. The established evacuation categories of precedence are urgent, priority, and routine.

a. The urgent category is reserved for those patients who must be evacuated within 2 hours to save life or limb. This means that patient will be evacuated immediately with a maximum time limitation of 2 hours.

b. Priority patients are those who must be evacuated within 4 hours. Priority also includes any patients whose condition is expected to deteriorate to urgent. This does not mean that it will be 4 hours before the patient is picked up. Rather, he will be evacuated as soon as possible within the limitation of available aircraft resources.

c. The routine category is reserved for patients whose con-

dition is not expected to deteriorate for several hours, normally more than 4 hours. Patients at field locations who require a medical consultation or have any minor injury or illness requiring treatment beyond the capability of the field medical personnel patients will be picked up as soon as all urgent and priority patients are safely evacuated.

d. It is sometimes necessary to clear patients from an area of operation because of the tactical situation. For example, a soldier on a small patrol sprains his ankle. Although the injury itself may not require evacuation, continuing presence of the injured individual may reduce the effectiveness of the patrol. In such a circumstance, evacuation may be requested using the categories above. This will be followed by a statement that the tactical situation dictates evacuation. This determination must be made by the tactical commander.

2-9. Evacuation Vehicles

a. Air ambulance or "medevac" helicopters are generally the most desirable type of evacuation, but they are not always available. Patients may outnumber the helicopters available. The enemy may have air superiority or enemy fire may prevent helicopters from landing or taking off. The weather may be too severe for helicopter operations. The flight may be too far, or incoming helicopters may reveal troop locations to the enemy.

b. When medevac helicopters are not immediately available, you may consider other types of evacuation. A helicopter gunship or troop carrier may be able to get in to the patient when other aircraft cannot. Troop carrier or gunship pilots often volunteer to carry out urgent patients. You should realize that a troop carrier is not equipped to carry patients and has no medically trained personnel aboard. In the gunship or troop carrier the patient must share floor space with ammunition boxes and weapons and the ride may be rough. You must decide whether it is wise to hold the patient until better transportation is available or to subject him to quick but rough evacuation by gunship or troop carrier.

c. Ground ambulances and other wheeled vehicles may be available. However, the patient's condition may be worsened by transporting him on such a vehicle. You must decide whether it is better to hold and treat the patient or evacuate him by the transportation available.

CHAPTER 3

LIFESAVING MEASURES

3-1. Danger of Acute Hemorrhage

Acute hemorrhage is a rapid loss of blood from the blood vessels. In the event of an acute severe hemorrhage (loss of at least two pints of blood), an emergency is present. If the bleeding is not stopped, the patient will die.

3-2. Blood

Blood is a mixture of water, salts, protein, red and white blood cells, platelets, food, waste, hormones, enzymes, antibodies, and other substances. The three most important elements of blood lost in acute hemorrhage are water, salt, and red blood cells. Water is the fluid that fills the blood vessels so the heart can function properly. Water also keeps other elements in suspension so they can be carried throughout the body. Salt maintains the proper chemical balance of body fluids; it must be contained in fluids used to replace lost blood. Red cells carry oxygen to the whole body including brain, heart, and other vital organs.

3-3. Vascular System

Blood is contained in a system of tubes or vessels called arteries, capillaries, and veins which together form the vascular system. The heart pumps the blood through the system. If a blood vessel is opened, bleeding results.

a. Arterial Bleeding. Blood leaves the heart through the arteries under pressure. If an artery is opened, blood will come out forcefully in spurts. With each beat of the heart there will be a corresponding spurt of blood. The larger the artery, the more rapid the blood loss.

b. Venous Bleeding. Blood flowing through veins is under less pressure than in arteries. However, a break in a vein will allow blood to flow out of it. The rate of blood loss depends upon the size of the opened vein.

3-4. Control of Hemorrhage

Control of hemorrhage is primarily mechanical. The mechanics of control consist mainly of closing off the open blood vessels. This

may be done in several ways. The method most feasible in one instance may not be best in another instance.

a. Direct Pressure. This is the best and usually the most practical, method for the company aidman to use. In this method, blood vessels are compressed against bone and flesh, usually by a pressure dressing applied directly over the wound. Almost any bleeding can be controlled this way. A special type of direct pressure is to apply a clamp directly to the bleeding vessel to close it off. Caution must be exercised that only the bleeding vessel is clamped.

b. Pressure Points. In this method, the artery is compressed at a point proximal to the wound, stopping the flow of blood. This method is not recommended if pressure must be maintained for a long period of time, but may be useful temporarily until a pressure dressing can be applied.

c. Tourniquet. A tourniquet will totally stop the flow of blood in the arm or leg beyond the tourniquet. Consequently, although it will stop the bleeding by compressing all the vessels, it is potentially dangerous because it deprives the uninjured tissues of blood. As a general rule, if a tourniquet is necessary, place it as close as possible to the wound between the heart and the wound to stop the bleeding. Some arteries, however, pass between two bones (as in the forearm) and cannot be compressed by a tourniquet. This would necessitate placing the tourniquet on the upper arm to stop the bleeding. Patients who have tourniquets applied should be clearly identified with a "T" on their forehead. Once applied, a tourniquet should never be loosened or removed, except under the supervision of a medical officer.

d. Elevation. If bleeding from a wound is only venous or capillary, elevation of the wound above the heart may slow the flow of blood. However, elevation is of no value in control of arterial bleeding, and may aggravate fractures.

e. Combination of Methods. A combination of measures is usually most effective. One combination is to use pressure points until a pressure dressing can be applied.

3-5. Clotting

Blood clots are formed by a chemical reaction that occurs when blood platelets escape from blood vessels. Slowing the flow of blood from a wound improves conditions for formation of a clot. A gauze dressing placed over a wound slows the escape of blood and gives it something on which to form a clot. This is another reason why a combination of gauze dressing and pressure is the best method of controlling external bleeding in combat wounds.

3-6. Internal Bleeding

Internal bleeding often results from penetrating or perforating wounds of the body, especially the abdomen and chest. Shock in patients with such wounds is good evidence of internal bleeding. In the field you can do little to control internal bleeding. The patient must be kept still to allow maximum blood flow to vital organs and prevent further internal damage. He should be evacuated as soon as possible. Do not give anything by mouth.

3-7. Anoxia

Anoxia, or lack of oxygen, is the most critical medical emergency. Vital organs, particularly the brain, cannot withstand anoxia—that is, cannot be deprived of oxygen—for more than 5 minutes without being damaged permanently. Oxygen deprivation can occur in one or more of the following conditions.

a. The atmosphere can be deficient in oxygen or contain poisons that prevent the body from using oxygen it takes in. Examples of these poisons are toxic chemical agents (toxic gases), carbon monoxide, smoke, and hot gases.

b. The respiratory system may fail or be prevented from taking in enough oxygen. Respiratory failure can be caused by—

(1) Blockage of the air passages by foreign matter such as water (drowning), mud, blood, vomitus, or wound tissue or by swelling caused by burns or other wounds.

(2) Injury to the part of the brain that controls respiration.

(3) Collapse of the lungs because of chest wounds or filling of the chest cavity with blood.

(4) Depression of the respiratory center of the brain by morphine or other drugs.

(5) Severe, extensive lung disease such as pneumonia.

c. The cardiovascular system may fail to circulate red blood cells. This can be caused by failure of the heart or large blood vessels due to trauma or disease and by insufficient volume in the vascular system due to loss of blood, water, or salt.

3-8. Artificial Respiration in the Acutely Injured Patient

If a patient stops breathing you must assist him immediately. The situation will dictate the method to be used. Regardless of the situation, however, immediate steps must be taken to clear the airway. If spontaneous breathing does not result, positive pressure artificial respiration must be begun (para 3-9). This is the only acceptable method of artificial respiration. It can be given mouth to mouth, mouth to nose, mouth to oral airway tubing, mouth to emergency surgical airway, or protective mask to protective mask by a connecting tube. Mechanical devices for supplying posi-

tive pressure are available at aid stations. Methods using negative pressure, such as the modified Sylvester method, are of no value.

a. Wound of the Face or Neck.

- (1) Clear the airway of blood clots and wound tissue.
- (2) Place the patient in the best position for drainage.
- (3) If the patient is not breathing, and if mouth-to-mouth or mouth-to-nose respiration is not possible, perform an emergency surgical airway and begin positive pressure respiration through this airway.

(4) Get assistance in controlling hemorrhage. Such a casualty may have two life-threatening problems: bleeding and breathing. Alone, you may be unable to save his life.

b. Wounding With Drowning. A soldier wounded while crossing a stream, a swamp, or a paddy often will sink under the water or mud. If you do not have time to recover him and move him to dry ground, you should do the following things—

- (1) Raise his head above the water.
- (2) Clear the airway of mud or debris with your fingers.
- (3) Using mouth-to-mouth respiration, give him one or two quick puffs of air.
- (4) Quickly remove some of his gear if it is too heavy to support.
- (5) Give him a few more quick puffs of air mouth-to-mouth.
- (6) Call for assistance.
- (7) Give him a few more puffs of air mouth-to-mouth while moving him from the line of fire and toward dry land.
- (8) If he is bleeding, request assistance in controlling the bleeding while continuing mouth-to-mouth respiration until his breathing is restored.

c. Blockage of Air Passage by Vomitus. This is a frequent cause of death. Vomiting can be expected in a patient semiconscious from heat exhaustion, or in a painfully wounded patient who has been given morphine, or in a man who has received a blow on the head or abdomen. Vomiting is common in a man who is unconscious, semiconscious, or stuporous while under the influence of alcohol or drugs. Aspiration (breathing in) of vomitus will block the airway. A person's airway can be blocked when he chokes on large pieces of food. Blockage of the airway requires the following immediate actions.

- (1) Clear the airway of the blocking material.
- (2) Give the man a few quick puffs of air mouth-to-mouth. If the blocking material cannot be removed and continues to block the airway, an artificial opening must be made in the trachea (para 3-10).

(3) After the opening has been made, the patient should

begin to breathe. If he does not breathe, you should perform mouth-to-artificial airway respiration. Continue artificial respiration until he is breathing. If there is no carotid pulse, external cardiac massage plus artificial respiration should be performed as described in paragraph 3-11.

d. Failure of Respiration Due to Injury to Nervous System or Overdose of Drugs. At once begin mouth-to-mouth artificial respiration and continue it until the patient can breathe or mechanical respiration is begun.

3-9. Mouth-to-Mouth and Mouth-to-Nose Artificial Respiration

The only acceptable methods of artificial respiration, short of mechanical devices or surgical airway, are mouth-to-mouth and mouth-to-nose. Both are methods of inflating the patient's lungs with the aidman's breath. The mouth-to-mouth method is preferred, but when the patient's jaw is tightly closed by spasm or when he has a mouth wound, the mouth-to-nose method may be used. Both methods are illustrated in figure 3-1. Steps in the expired air technique are as follows.

a. Position the patient on his back.

b. Clear the upper airway by running your fingers behind his lower teeth and over the back of his tongue. Remove any dentures or foreign material.

c. Turn his head face up. Tilt the head back so that the neck is stretched and the chin is up (fig 3-1①).

d. Adjust the lower jaw so that it juts out (fig 3-1② and ③). This positioning moves the base of the tongue away from the back of the throat, thus clearing or enlarging the air passage to the lungs.

e. Seal the airway opening (either the nose or the mouth) which is not being used. The seal must be secure to keep air from leaking during inflation. Pinch the nostril shut with your free fingers or seal the mouth by placing two fingers lengthwise over the patient's lips (fig 3-1④ and ⑤).

f. Take a deep breath. Open your mouth wide and make an airtight seal around the patient's mouth or nose.

g. With your eyes focused on the patient's chest, blow forcefully into his airway. Rising of the patient's chest indicates air is reaching his lungs. If the chest does not rise, you must take these corrective actions.

(1) Hold up his jaw more forcefully and hyperextend his neck.

(2) Blow harder into his mouth or nose, making sure air is not leaking from the other airway opening.

(3) Recheck his mouth for foreign matter. If there is a defi-



Figure 3-1. Steps in mouth-to-mouth and mouth-to-nose artificial respiration.

nite obstruction of the airway, an emergency surgical opening must be made.

(4) Remove your mouth, listen for the return of air from the patient's lungs. If the exhalation is noisy, elevate his jaw further.

(5) This procedure should be repeated 12 times a minute.

h. If these steps fail to permit inflation of the lungs, an emergency surgical airway must be made.

3-10. Emergency Surgical Airway

Again, most airway obstructions are relieved by nonsurgical measures. Clearing the upper air passages with the fingers, positioning the head, neck, and body, adjusting the lower jaw, or a sharp blow on the patient's back may be all that is needed to dislodge an obstruction. Persistent obstruction of the airway, however, requires an immediate surgical airway for relief. Diagnosis is established when the patient's lungs cannot be inflated by mouth-to-mouth (or mouth-to-nose) respiration.

a. A patient with persistent airway obstruction will be hard to restrain, if conscious, so you will need someone to help you hold him.

b. Quickly get the sharpest cutting instrument you can find.

c. Have your assistant immobilize the patient while you locate the area over the cricothyroid membrane to make an incision.

d. The cricothyroid membrane is the best place to make an emergency surgical airway. It is just beneath the skin in the middle of the front of the neck. It is between the thyroid cartilage ("Adam's apple") just above it and the less prominent (in males) cricoid cartilage below it. See figure 3-2 for location of incision site.

e. While immobilizing the skin and trachea with one hand, make an incision horizontally over the cricothyroid membrane through the skin. Then make a second incision into the larynx through the membrane until a finger-sized opening is obtained.

f. At this point, the patient should make a gasping inhalation through the opening which you have made. Enlarge the opening enough with your fingers to allow complete filling of the lungs. Let the patient breathe through the opening until he is partly stabilized while you assist by stretching the opening.

g. Insert a cannula or a tubelike item into the opening. Secure the cannula in the trachea, as in figure 3-3, to prevent it from being aspirated or dislodged. Any tubelike item may be used, including the barrel of a ball-point pen.

h. Place the patient in a position most comfortable to him.

i. If the patient does not breathe on his own, apply positive pressure respiration to the airway.

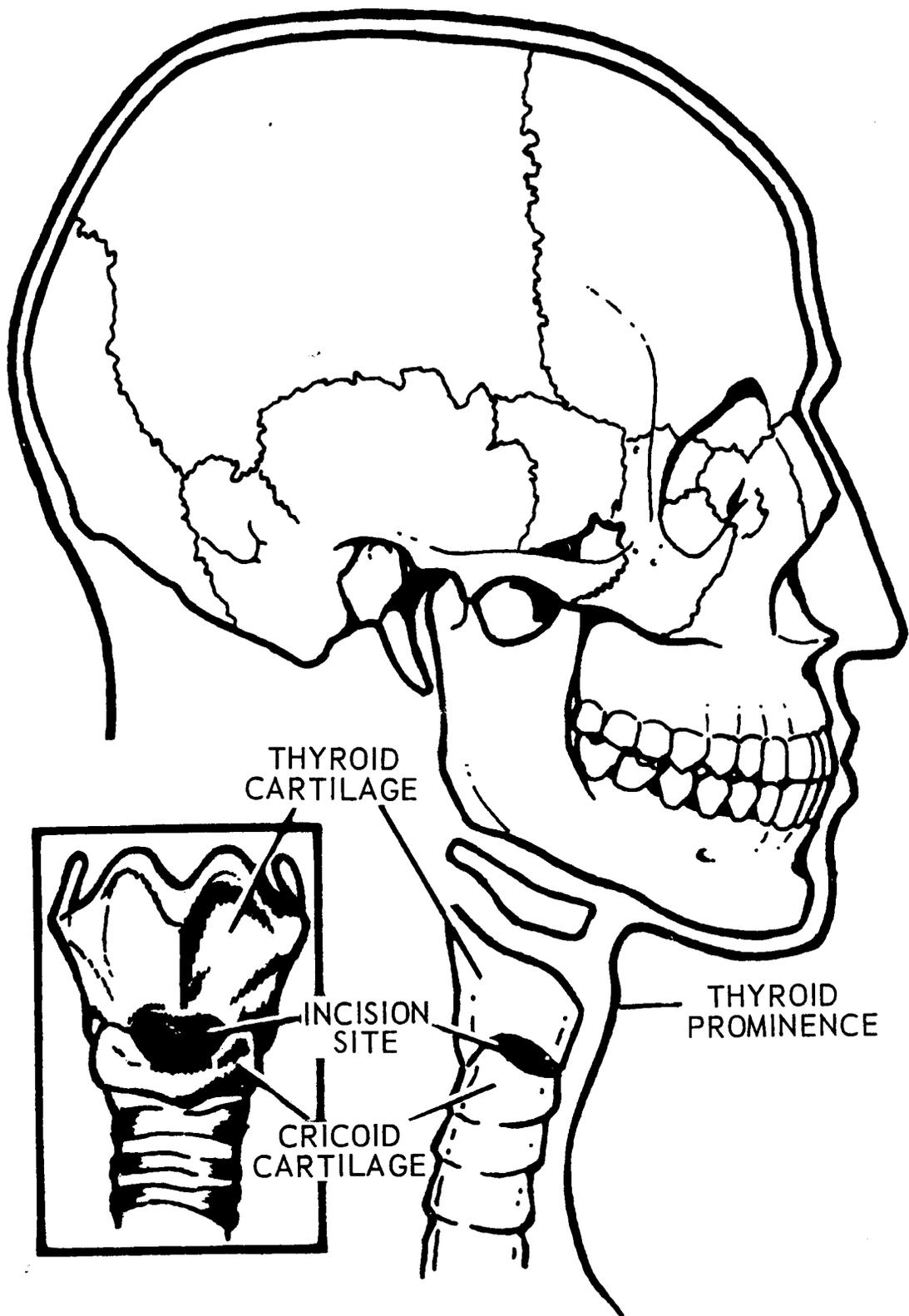


Figure 3-2. Site of incision for cricothyroidotomy.

3-11. Cardiac Arrest (Heart Stoppage)

Cardiac arrest, or heart stoppage, may be caused by insufficient oxygen supply to the heart or the brain, blockage of blood vessels of the heart, heart disease, foreign particles in the bloodstream (embolism), or overdosage of some drugs. Respiratory arrest is the most common cause of cardiac arrest. The heart will stop within minutes after breathing ceases.



Figure 3-3. Cannula inserted and secured in trachea.

a. Signs and Symptoms.

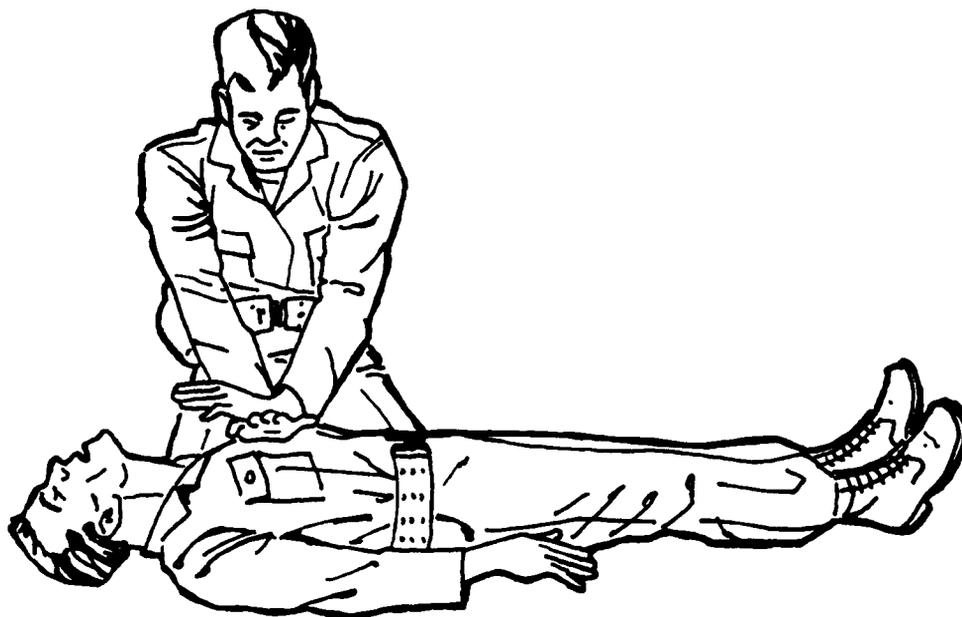
- (1) Absence of a carotid pulse.
- (2) Cessation of breathing.
- (3) Dilated pupils of the eyes.
- (4) Unconsciousness.
- (5) Limp body and flaccid skin.
- (6) Cyanosis.

b. Actions to Take Immediately.

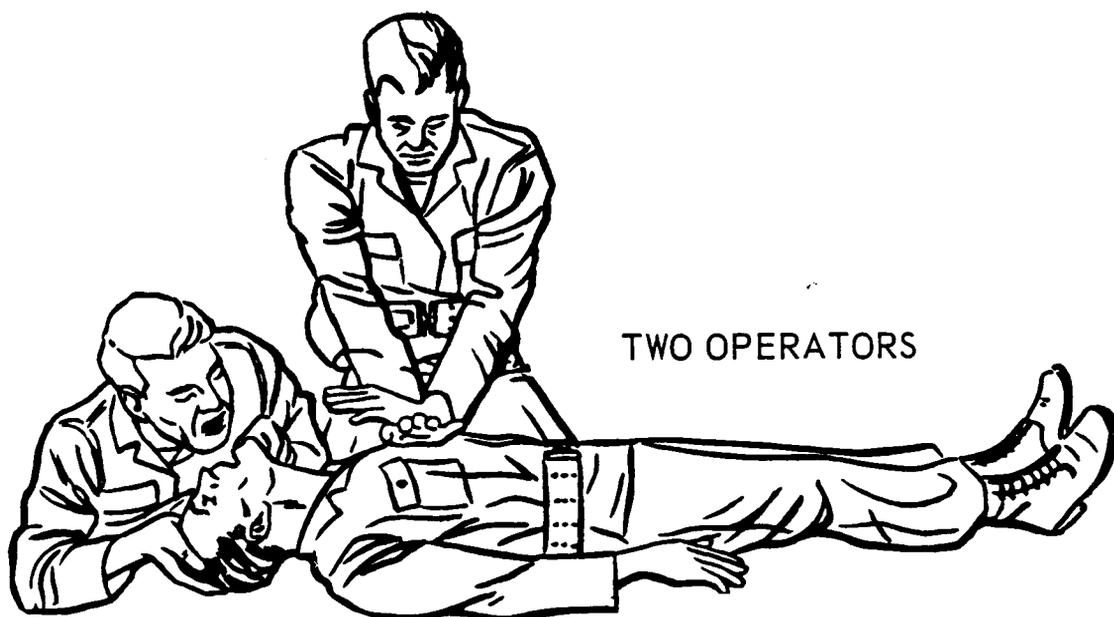
- (1) Roll the victim onto his back.
- (2) Check his airway and remove any obstruction.
- (3) Hyperextend the neck and lift the lower jaw for mouth-to-mouth artificial respiration.
- (4) Give him five quick puffs of air by mouth-to-mouth.
- (5) Place the heel of your hand on the lower half of the sternum and press down until the sternum is depressed about 2 inches, as in figure 3-4①. Repeat this compression about 15 times, about 1 per second.
- (6) Return to mouth-to-mouth artificial respiration and give the victim two respirations.
- (7) Repeat this 15-2 cycle until help arrives or you are certain the patient is dead.
- (8) If help is available, one person should give the cardiac compressions and the other should give mouth-to-mouth artificial

respiration as in figure 3-4②. The ratio with two operators should be about five compressions to one artificial respiration. The compressions should not be interrupted, even for the respirations. When respiration is being applied, the compressions must be stopped momentarily.

(9) The cardiac compressions should equal about 60 per minute, the respirations about 12 per minute.



ONE OPERATOR



TWO OPERATORS

Figure 3-4. Cardiac compression applied by one operator and by two operators.

3-12. Shock

Shock is a complex subject, but basically it means that the body tissues are not getting enough blood. The most common cause is hemorrhage where blood escapes from the vascular system and consequently does not get to the tissues.

a. Diagnosis. There are four broad areas of symptoms in shock. The first involves feeling the pulse, which is usually abnormally rapid. There is also a drop in blood pressure which is detectable by a weakened pulse. The second area is increased respiratory rate—the body's response to the lack of oxygen in the tissues. The third area is the skin which is usually cool and clammy and pale due to decreased blood flow. The fourth is changed mental state. In early shock, the patient frequently is agitated and restless. As the shock worsens and the brain is deprived of blood, drowsiness and unconsciousness result. In addition to these con-

siderations, certain wounds are commonly associated with shock.

Treatment for shock should be begun when these symptoms appear. These

wounds are: the belly, chest, neck, or head.

Wounds which have damaged a major blood vessel. Many bullet wounds of the

torso, arm, or leg. Fracture of a large bone. Shock frequently accompanies a fractured

bone. A blood loss of 1 quart or more is a serious ground, for example. If the patient has a dry field dressing, this indicates a serious loss. Treatment for shock might try is to pour water over the patient. A water it takes to saturate

the patient and insure that the patient is breathing. Position the patient on his back to enhance the flow of blood to the brain. Give oxygen and fluid therapy, preferably intravenous fluids cautiously in the presence of possible intracranial injury. Make sure the patient is comfortable and reassure him. This can help prevent worsening of

the shock. Figure 3-5 shows several types of intravenous injection set. One way

When these wounds are present, treatment should be begun even before the clinical signs and symptoms of shock. Wounds include:

(1) Any wound which penetrates the chest, abdomen, or pelvis. Internal bleeding is a likely possibility.

(2) Any wound of the arms or legs which involves a large portion of tissue at least as big as a fist. Wounds of the thigh are in this category.

(3) Any wound which includes a large blood vessel. Blood loss of at least 1 quart frequently occurs. A femur, for example.

(4) Any wound which results in a large blood loss. The blood may be visible on the ground. If the blood has completely soaked a standard field dressing, it indicates loss of nearly a quart into the dressing. A useful experiment you can do is to pour water into a dry field dressing to see how much water it takes to saturate it.)

b. Treatment. First, stop the bleeding. Make sure the patient is breathing adequately. Position the patient with his head down to enhance the flow of blood to the brain. Immediately begin intravenous (I.V.) therapy through at least two veins. Administer fluids cautiously in the presence of possible intracranial injury. Make sure the patient is comfortable and reassure him. This can help prevent the shock.

c. Available Intravenous Solutions. There are several types of intravenous solutions and an intravenous

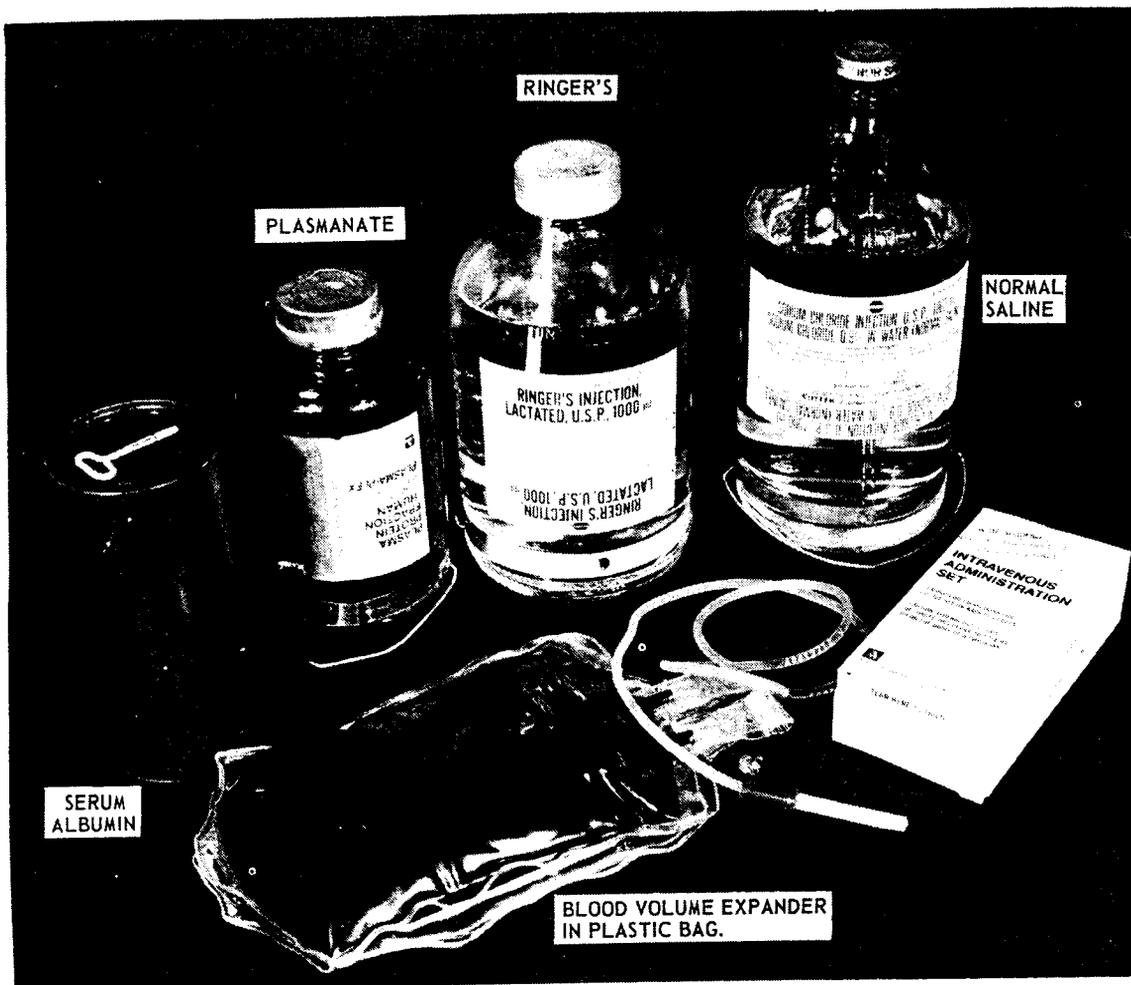


Figure 3-5. Blood volume expanders and infusion set.

of carrying bottles—in canteen covers—appears in figure 3-6. Solutions available to you include the following:

(1) Ringer's lactate solution (lactated Ringer's injection) is the most commonly used volume expander for treating hemorrhagic shock when blood is not available. It is a sterile solution of calcium chloride, potassium chloride, sodium chloride, and sodium lactate in water for injection. Its composition is closer to that of the extracellular fluid than is that of any other solution employed as a fluid and electrolyte replenisher. It expands the extracellular fluid volume which includes the blood volume. Ringer's solution is normally supplied in 1,000 cc. bottles but it can be procured in 500 cc. plastic containers.

(2) Normal saline (sodium chloride solution) is the second most commonly used intravenous fluid replacement. It can be used interchangeably with Ringer's lactate solution and is also an expander of extracellular fluid volume.

(3) Plasmanate is derived from human plasma which has been heat-treated to kill the hepatitis virus, and diluted to 5 percent strength in a solution similar to saline. Plasmanate is rich in albumin and tends to remain in the blood vessels; thus, it is a

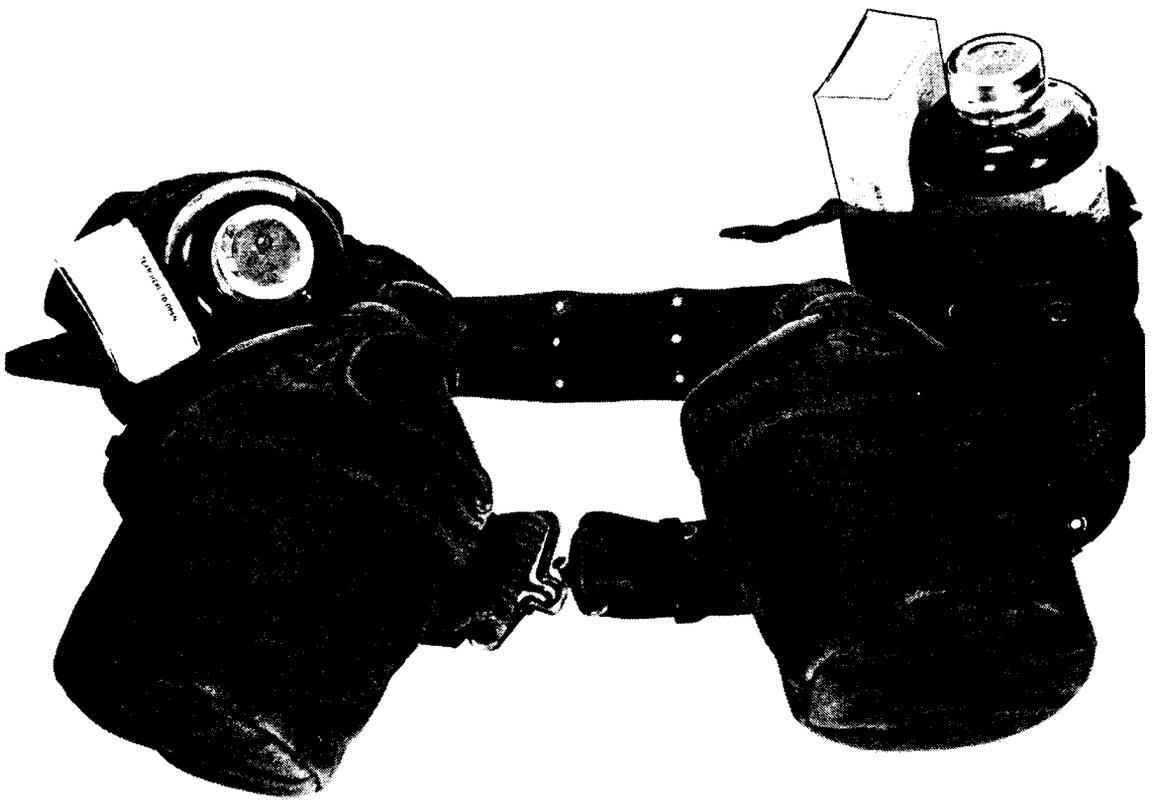


Figure 3-6. Blood volume expander carried in canteen cover.

plasma expander. It is an excellent replacement fluid for shock. It is supplied in 500 cc. bottles.

(4) Serum albumin is a concentrated protein in a small volume of water. It is useful in treatment of shock primarily if given with saline or Ringer's lactate. Used alone, it attracts water from within the cells and tissue spaces into the bloodstream. This may be dangerous, especially if the shock is due to dehydration, as in severe diarrhea. It is usually supplied in 100 cc. vials.

d. Use of Fluids in Hemorrhagic Shock. Blood is the best volume expander. It should be used in preference to anything else to treat shock due to hemorrhage. To avoid a reaction, only the proper type of blood should be given. You may not have either the blood or the facilities for typing it. As rapidly as possible, get the patient to where these facilities and blood are available. Meantime, start rapid replacement (two intravenous injections) with saline or Ringer's lactate. If plasmanate is available, use it instead. In an emergency, when evacuation will be delayed several hours, oral saline solution can be of great benefit if the patient does not have an abdominal wound and if he is fully conscious. Mix the salt and soda packet from your aid bag in the coolest potable water you can get. Encourage but do not force the patient to drink it. If he vomits, go slower, and keep trying to have him drink it. Usually he can keep down most of it. If you are isolated overnight with a patient who has a 50 percent burn, 7 to 10 liters (or quarts) of oral saline may keep him alive.

CHAPTER 4

WOUNDS: CLASSIFICATION, STABILIZATION, AND EVACUATION

4-1. Classification of Wounds

For treatment and recording purposes, wounds are classified by cause, type, or appearance.

a. Classification by Cause.

(1) *Bullet wounds.* These wounds differ according to the type of weapon that fires the bullet. Damage to underlying tissue is affected by the size of the bullet and the velocity of the bullet as it strikes the patient.

(2) *Fragmentation wounds.* These are wounds made by fragments of exploding grenades, mortars, mines, booby traps, rockets, bombs, and artillery rounds. The explosion throws bits of metals in all directions, often causing multiple wounds of varying sizes.

(3) *Wounds due to falls.* A fall while a soldier is taking cover, especially with a pack on his back, can cause twisting, tearing, or wrenching wounds. A fall from a moving vehicle may result in broken bones and bruises.

(4) *Burns.* Burns can be caused by many sources. The ones encountered most frequently are napalm weapons, flame throwers, gasoline, white phosphorus grenades, or marking rounds. Burns are discussed in detail in paragraph 5-10.

b. Classification by Appearance.

(1) Bullets and shell fragments make penetrating wounds, perforating wounds, or both. A penetrating wound is one in which the bullet or fragment enters but does not leave the body. Knife or bayonet wounds also are included in this category. A perforating wound is one in which the bullet or fragment goes all the way through the body and makes at least two wounds, one of entrance and one or more of exit. The exit wound is often larger than the wound of entrance and may be located in an area of the body distant from the entrance wound. Therefore, every patient with a bullet wound must be examined thoroughly to see if he has more than one wound.

(2) A laceration is a cut or a tear. Unless they involve major blood vessels or impair breathing, lacerations are not a special

lifesaving problem for the aidman. Since they can be large and appear nasty, they may make the patient apprehensive. Usually there is more fright than pain with a laceration. The main problem with a lacerated wound incurred in combat is that it becomes infected easily. To prevent infection and to promote growth of new tissue, the wound must be debrided. The process of debriding, or debridement, is the surgical removal of all dirt, contamination, and dead tissue. This procedure must be done at a treatment facility under sterile conditions. After debridement such wounds are often left unsutured for a few days. The procedure, called "delayed primary closure," or "DPC," prevents infection and permits better healing. All combat wounds, regardless of size, are considered contaminated and should receive delayed primary closure.

(3) A closed wound is one with internal damage to bones or tissue without a connecting wound in the outer skin. Sprains, strains, dislocations, and certain fractures are closed wounds.

4-2. Relief of Pain

Some pain occurs after most wounds. Pain may be mild or severe, depending upon the patient and the wound. The patient's state of mind at the time of wounding will have some effect on the degree of pain. Fear and apprehension, for example, make it worse. To some patients the fear of pain is more real than the pain itself. You must decide whether or not the relief of pain is in the best interest of the patient. In many cases, pain is a helpful symptom to medical personnel. Pain is nature's alarm system; silencing it may be detrimental to the patient.

a. You can give him some relief in these ways.

(1) *Positioning.* The best position is the one which the patient finds most comfortable. Positioning the injured part to relieve stress can do much to relieve pain.

(2) *Reassurance.* Talk to him reassuringly. Make him feel that he is in good hands and more help is on its way. The best type of reassurance is for you not to panic and to act as if everything is under control.

(3) *Medication.* Administer an analgesic such as aspirin or APC. If oral medications and fluid are not contraindicated, aspirin is an outstanding drug and will relieve all but the most severe pain.

b. If the pain is extremely severe, you may have to give morphine if it is not contraindicated (para 4-3d).

4-3. Use of Morphine

a. Morphine is the best pain relieving medicine you have, but it has several dangerous toxic effects. It is a powerful depressor of the central nervous system, greatly reducing respiration and pain

sensation. Also it causes vomiting, dry mouth, constipation, and retention of urine. It must not be given by anyone who is not fully aware of its dangers. Never let morphine out of your possession. It may be stolen for personal use or sale on the black market.

b. Morphine is supplied to you in 16 mg. (one-fourth grain) syrettes. The number of syrettes you carry is determined by your medical commander on the basis of the tactical situation, availability of evacuation, supply, and your ability to administer it intelligently. You must know the indications and contraindications for its use. If not you may do more harm than good. (Contraindication is any condition which makes a particular treatment undesirable or improper.)

c. Morphine is *indicated* for severe pain especially when the evacuation lag time is more than 20 minutes. In a tactical situation where a psychotic patient must be temporarily silenced or sedated, and no other tranquilizers are available, one syrette of morphine is often effective in controlling such a patient. This is an emergency measure only. There are better, nonaddicting drugs for psychosis than morphine.

d. Morphine is *contraindicated* when its toxic effect will compound an injury to a dangerous degree. Do not give morphine to: patients who are to be quickly evacuated, who have chest injuries, depressed respiration, or injuries of the head. Never give morphine to an unconscious patient. Do not give morphine before surgery. If there is a probability that the patient may soon be operated on, he should not get morphine. Both morphine and surgical anesthesia depress respiration. If the patient is in shock, you should not give him morphine because it will not be absorbed due to poor circulation. (Medical officers sometimes administer morphine intravenously while the patient is in shock. Never should you try to give morphine intravenously. If it is given too fast it will be fatal.) A dose of morphine should not be repeated within 2 hours, or if there is any reason to believe the first dose has not been absorbed.

4-4. Treatment of Open Wounds

Control of hemorrhage, relief of pain, and prevention of infection are the main considerations in treating wounds in the field.

a. Acute loss of blood may lead to shock, and shock may lead to death. So, you should do all you can to prevent loss of blood. The preferred method of controlling bleeding is with a pressure dressing securely applied. Lost vascular fluid (blood) or body fluid (tissue fluid) should be replaced. Use oral or intravenous fluids as prescribed in paragraph 3-12.

b. Some wounds are more painful than others. In some traumatic amputations there may be relatively little initial pain, while

in smaller wounds the pain may be severe. Second degree burns and massive tissue wounds involving many nerves are initially painful. Nearly all wounds cause some pain. Things you can do to relieve pain are described in paragraphs 4-2 and 4-3.

c. Any combat wound must be considered contaminated. The best way to prevent more contamination is to cover the wound with a sterile dressing. Combat wounds are "dirty" wounds. All contain bacteria. In the field, there is no way for you to cleanse a wound of bacteria. Pouring antiseptics into a wound will not kill all the bacteria and may be harmful. Pouring antiseptics on the skin around a wound does little to keep out bacteria and should be avoided. When possible, and when evacuation is impossible or delayed for longer than several hours, gentle cleansing of the skin around the wound with soap and water may be helpful.

4-5. Factors Affecting Infection

Infection of a wound involves the number and type of pathogenic organisms entering the wound, condition of tissue in the wound, and the body's defense.

a. If the number of organisms is extremely large, they may overwhelm the body's defense by sheer numbers. This is likely to happen in wounds caused by booby traps with filth and contamination about them. Punji stake wounds are another example.

b. Some organisms are more toxic than others. For example, the organisms that cause gas gangrene and tetanus are deadlier than some organisms that form pus.

c. A cleanly cut wound is not as apt to become infected as a torn, jagged wound. In the first type of wound, blood tends to flush out organisms and they have few places to hide and become imbedded. The second type of wound gives organisms devitalized tissue to hide in and has much less flushing action by bleeding. A puncture wound is most likely to become infected with tetanus and gas gangrene because of lack of oxygen. Penetrating and perforating wounds are usually heavily contaminated by foreign material carried into deep parts of the body. Penetrating abdominal wounds often permit contaminated intestinal contents to leak into the cavity.

4-6. Treatment of Closed Wounds

a. *Sprain.* A sprain is the twisting, tearing, and stretching of ligaments around a joint. Ligaments are strong, slightly elastic, fibrous bands of tissue that hold bones in position. A ligament can be over-stretched and some of its tissue cells injured, or it can be torn loose from its attachment to the bone. An injured ligament heals slowly and sometimes never entirely returns to normal. Diagnosis is made by the presence of a tender, painful joint with

swelling. Fracture also must be considered a possibility with these findings.

(1) A sprain is treated so as to temporarily replace the function of the ligaments by supporting the joint while allowing some movement. You carry elastic rolled bandages for this purpose. A figure-of-eight bandage around the joint should allow the patient to complete his immediate mission. The bandage should be adjusted as swelling occurs. Have a medical officer evaluate the patient after mission.

(2) Analgesics may be given for pain.

(3) Routine evacuation may be indicated.

b. Strain. A strain is an overstretching of a muscle or the muscle's tendon. In combat, some muscles will be forced to function long after they are tired. This results in acute muscle fatigue or muscle strain. Diagnosis generally involves finding tender, painful muscles. Swelling is uncommon.

(1) There is little you can do to treat a strain in the field. The patient needs rest with just enough exercise to keep the muscle from getting too stiff. You cannot provide this type of treatment in the field.

(2) Analgesics may be given for pain.

(3) Heat and massage are also very helpful.

(4) If the strain is severe, routine evacuation is indicated.

c. Dislocation. A dislocation is the displacement of one of the bones forming a joint. A joint is the articulation of two or more bones. When one end of a bone forming a joint is forced out of its articulation, it is dislocated. The dislocation may be incomplete and temporary. In other words, it may jump out of and back into normal position, resulting in a condition much like a sprain. If the bone dislocates from its articulation and remains out of place, it is a complete dislocation. Damage to surrounding blood vessels and nerves may result.

(1) You should not try to reduce a complete dislocation in the field.

(2) Analgesics should be given for pain.

(3) Immobilization of the joint in the position of least pain may be helpful. Usually that is the position in which you find it.

(4) Routine evacuation is indicated unless damage to blood vessels or nerves is suspected because of paralysis, numbness, or absent pulse. In that case, priority or even urgent evacuation may be necessary.

d. Fractures. For treatment of fractures, see paragraph 4-7.

4-7. Fractures

Fractures, or broken bones, are the result of a strong blow or stress against the body causing one or more bones to crack or

break completely. Fractures are either closed (no break in the skin) or open (skin broken). Open fractures are generally more serious, because of the danger of infection.

a. Diagnosis. The patient with a broken bone is almost always in pain at the fracture site. He will give a history of trauma or stress and often will state that he felt the bone snap or give way. He typically has great difficulty in moving the part of the body beyond the fracture. As you examine the patient, you will find swelling and tenderness at the fracture. The broken limb may be obviously deformed. Ultimately, X-rays will be needed to establish the diagnosis and extent of the fracture.

b. Treatment. As with any wounded patient, the first thing to do is save his life. Make sure he has a clear airway and can breathe. Stop external bleeding. Almost every fracture is accompanied by significant internal bleeding. A fractured femur, for example, may involve loss of as much as 1,500 cc. of blood into the thigh. Plainly, then, a patient with a fracture of a major bone is in danger of developing hemorrhagic shock. Therefore, intravenous solutions should be started as soon as possible on any patient with a fracture of a major bone. Place a dry sterile dressing over the wound if it is an open fracture. Administer analgesics for pain. The patient must be evacuated, but the category depends upon the seriousness of the fracture.

c. Splinting. Do not attempt to reduce or set a broken bone. In general, splint the fractured limb as you find it, checking the pulse beyond the fracture before and after splinting. If the pulse disappears after the splint is applied, it is on too tight and must be loosened. Also a record of nerve function distal to the fracture should be made. If the fractured limb is bent so that it pinches off the blood vessels, you may straighten it carefully as long as no force is needed. Never try to force an arm or a leg to lie straight. Splinting is extremely valuable because it prevents further damage to surrounding tissues by the broken bones. Also, splinting helps to reduce bleeding and pain.

d. Splints. Splints and splinting in the field will pose some problems. You do not carry splint sets, such as the Army leg splint set. You may carry the wire fabric splint. Some aidmen carry two wire ladder splints wrapped around the outside of the aid bag as in figure 4-1. To support missions where fractures might occur, you may carry a few pneumatic splints. The ones used most in the field are improvised and anatomical splints (fig 4-2).

(1) An improvised splint is made of any rigid material that is readily available. Parts of the patient's gear are often the handiest material you can use. Rolled or folded, the patient's poncho makes a good splint. So does his rifle when rolled in a jacket. (Be



Figure 4-1. Wire ladder splints wrapped around an aid bag.

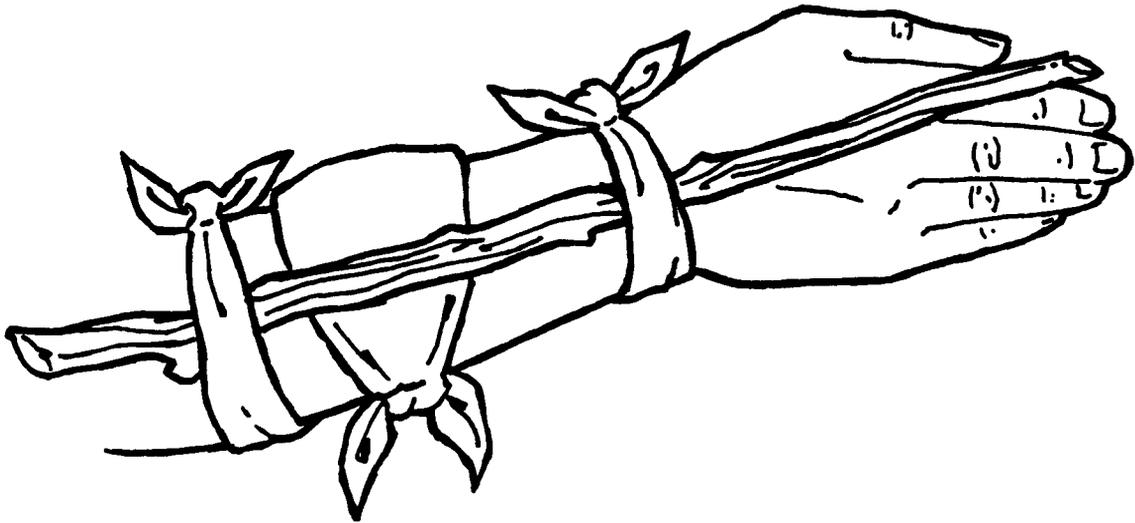
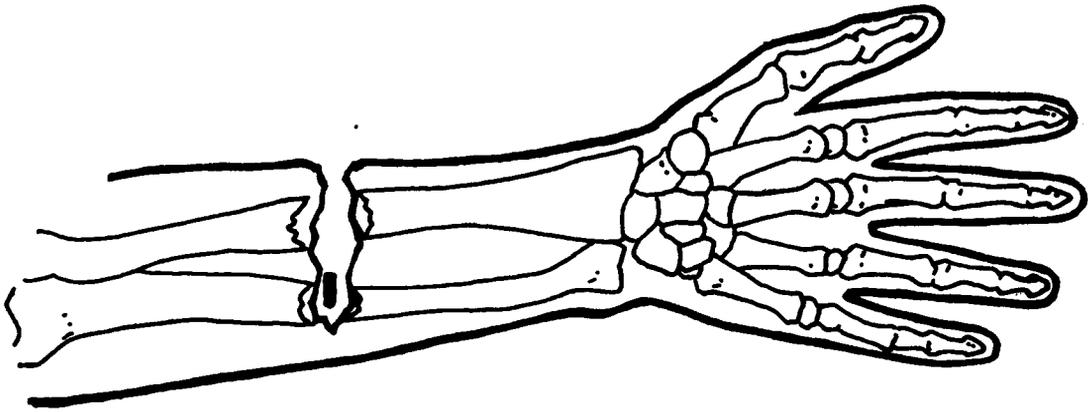
sure the rifle is cleared.) Poles or branches from trees also can be used to make splints.

(2) How much time you can spend on improvising a splint will depend upon the tactical situation. There may be instances where you have no time to improvise a splint. In that case, for a fracture of the forearm, quickly place the arm inside the jacket and tuck the jacket as tightly as possible. A fracture of the upper arm could also be treated this way or with a sling around the neck to the wrist. For a fracture of the leg, quickly tie the broken leg to the uninjured leg. This is an example of an anatomical splint, where one part of the body is used to help immobilize another part.

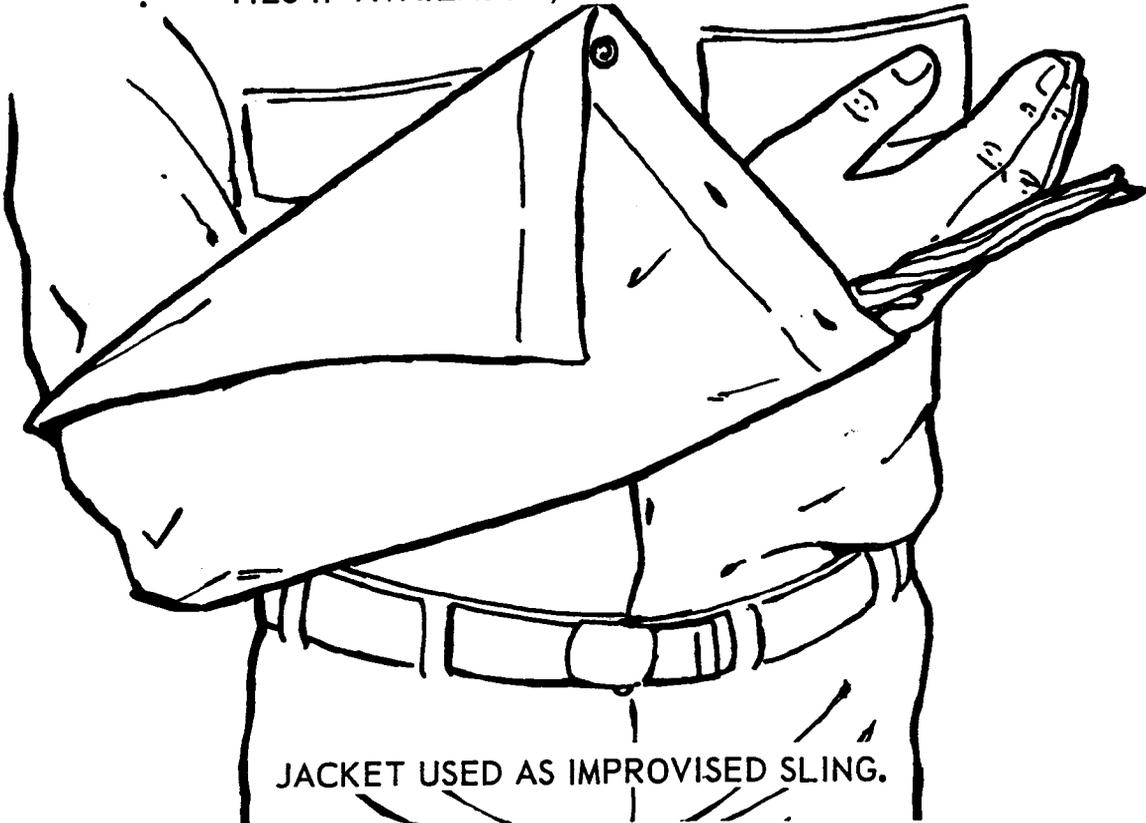
(3) The wire fabric splint is useful in supporting a massive tissue wound. It can be fashioned to help support a broken ankle, wrist, or small bone.

(4) The wire ladder splint can be used for a fractured arm or leg or to support a massive tissue wound. You should control the bleeding before applying a splint. If not, put on the splint so it can be removed easily and quickly.

(5) A pneumatic splint (fig 4-3) is inflatable and made of transparent plastic. You blow air into it by mouth to get the necessary rigidity. Do not use any other means for inflation (such as a tank of compressed air). The splint requires no padding and it can be inflated or deflated as desired. The splint should not be



DRESSING AND IMPROVED SPLINT ON OPEN FRACTURE (MORE RIGID MATERIAL AND MORE TIES IF AVAILABLE).



JACKET USED AS IMPROVED SLING.

Figure 4-2. Examples of improvised and anatomical splints.

inflated and left on the patient more than 30 minutes at a time. To do so will interfere with peripheral circulation. Reduction of peripheral circulation for a long time causes tissue anoxia, which in turn results in damaged or necrotic tissue. Tissue damage is proportional to the duration of diminished peripheral circulation and the degree of tissue anoxia. Therefore, if the patient must wear a pneumatic splint for an extended time, partially deflate it every 20 to 30 minutes for a few moments to reestablish peripheral circulation if it appears that the blood supply to the extremity has been impaired. Do not use these splints unless you have time to check the patient every few minutes.

(6) Army leg splint sets are stocked at aid stations, clearing stations, dispensaries, hospitals, and medical depots. If time and the tactical situation permit, you may ask the evacuation vehicle operator to bring you an Army leg splint if its application is indicated. This splint is especially valuable in protecting the nerves and blood vessels.

4-8. Dressings

A dressing is a pad that is applied directly over a wound. A prepared dressing is usually made of gauze but it can be made of any

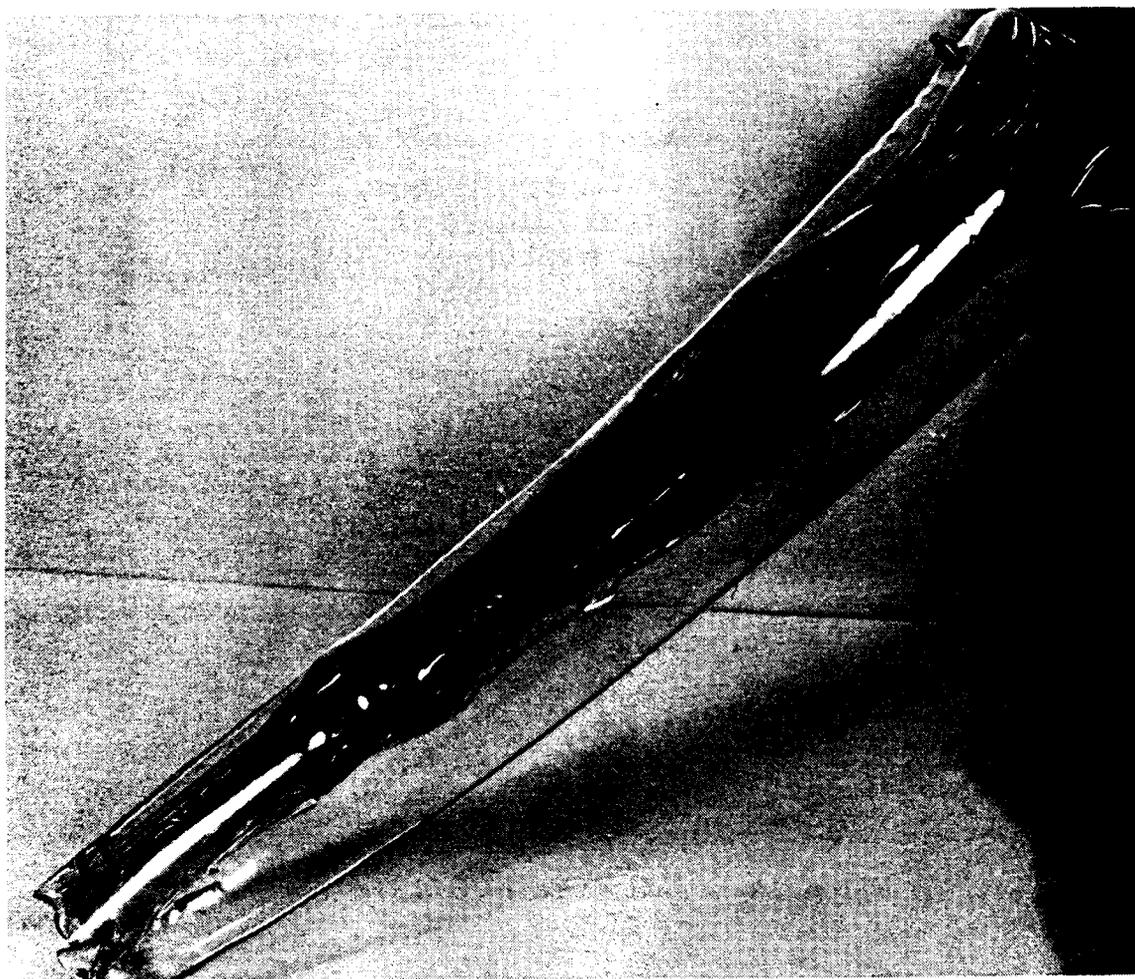


Figure 4-3. Inflated pneumatic splint applied on a patient's arm.

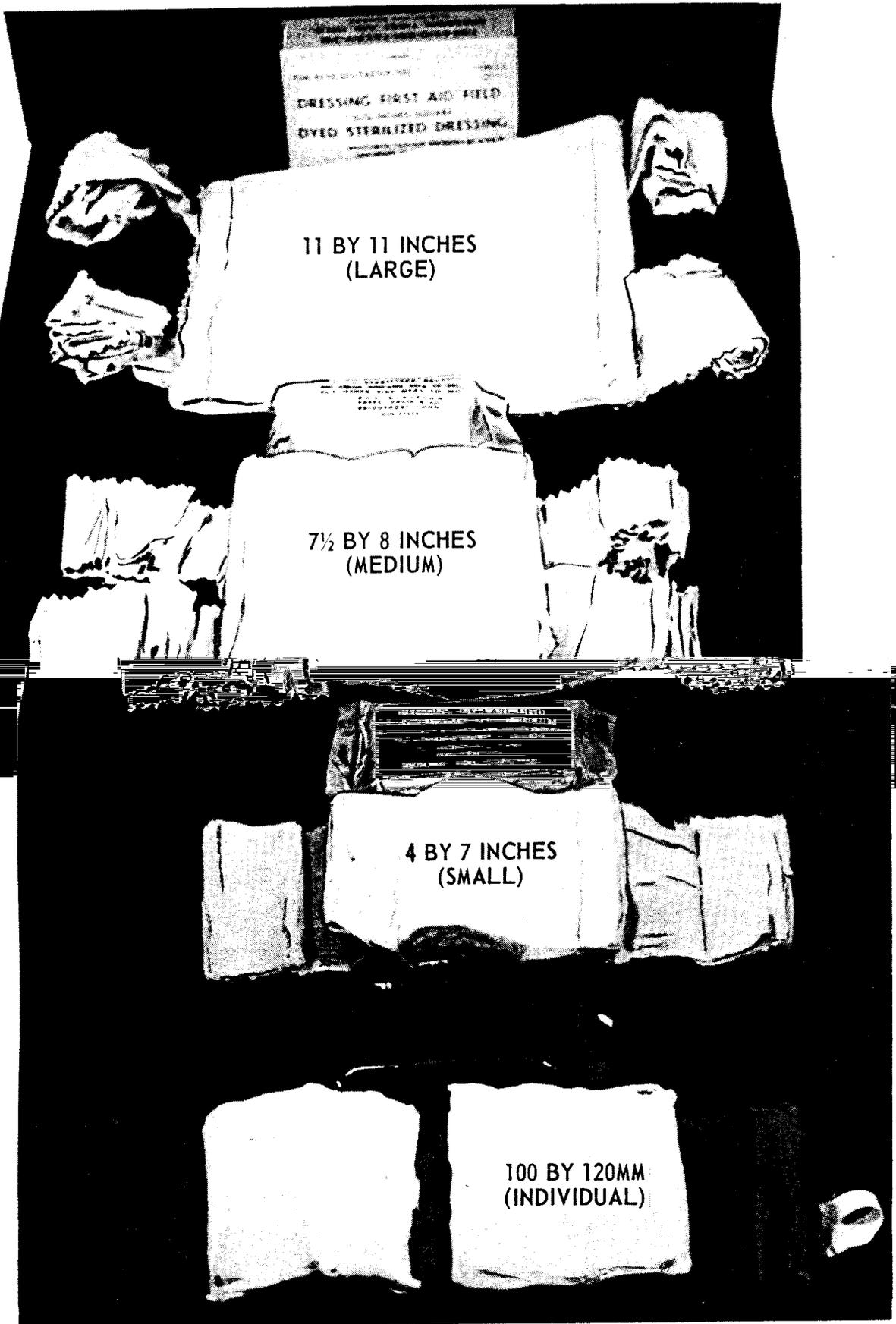


Figure 4-4. Popular sizes of field dressings.

is to control hemorrhage and protect a wound against further contamination. Almost all external bleeding can be controlled with a correctly applied field dressing.

a. Sizes. The most popular sizes of field dressings, shown in figure 4-4, are described below.

(1) *Dressing, first aid, 4 by 7 inches.* This small field dressing is the one you probably will use most. You should carry a plentiful supply of these. Many aidmen carry two aid bags, one filled with dressings and one containing other items. Be sure each soldier carries at least one small field dressing.

(2) *Dressing, first aid, field, 7½ by 8 inches.* This is usually called the medium field dressing. The average aidman carries two of these. They are used often to reinforce the small field dressing.

(3) *Dressing, first aid, field, 11 by 11 inches.* This is the large field dressing. You usually carry one of this size. Most aidmen prefer to carry more small dressings and use two or three small ones instead of one large dressing. You can contour two or three small dressings better than a large one. Large dressings are best for extensive burns.

(4) *Dressing, first aid, field, individual troop, 100 by 120 mm.* This is a two-piece dressing designed to allow one gauze pad to slide along the affixed bandage. One purpose of this adjustable dressing is to allow application of the dressing over a perforated wound of an extremity to cover the wounds of entrance and exit with the same dressing. This dressing is smaller and more versatile than other field dressings.

b. Application. A field dressing has strips of gauze bandage attached to it. The gauze strips or tails are used to secure the dressing and to apply pressure. First, put a small dressing over the wound and tie the bandage tails firmly over the dressing to apply pressure. If the first dressing does not control bleeding, apply a second one over it. Again, tie the bandage tails firmly. Several small dressings are more effective than one large dressing for controlling hemorrhage.

4-9. Bandages

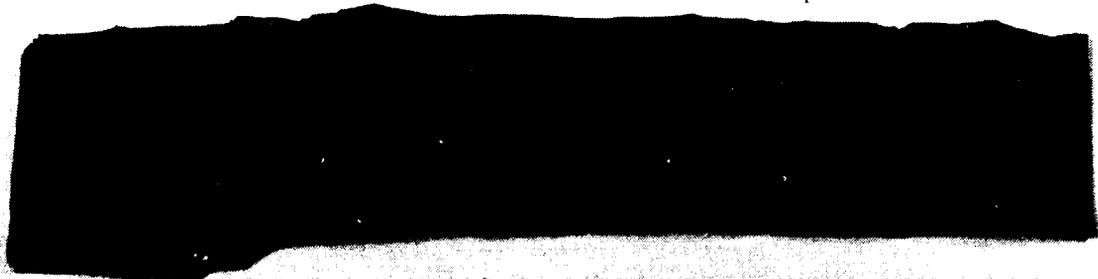
A bandage is a piece of material used to cover a dressing, apply additional pressure, or immobilize a part of the body. Bandages may be made of gauze, muslin, or elastic cotton (fig 4-5). They may be rolled or folded. Most aidmen prefer to carry a few elastic rolled bandages about 3 inches wide. Elastic bandages are used to reinforce dressings in the control of hemorrhage and to support ankles and knees. Rolled gauze bandages are not often used in the field. Triangular muslin bandages are sometimes used for support but are used most as tourniquets. Folded triangular bandages (cravats) are useful in applying improvised splints.



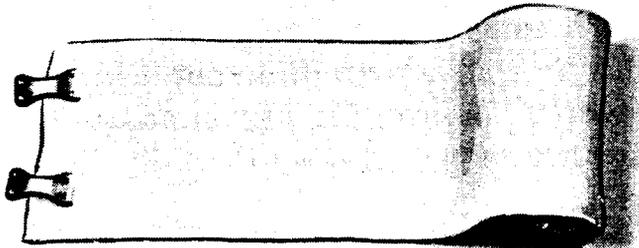
BANDAGE, MUSLIN, 37 BY 37 BY 52 INCHES.



BANDAGE, TRIANGULAR (MADE FROM BANDAGE, MUSLIN).



BANDAGE, CRAVAT (MADE FROM BANDAGE, MUSLIN).



BANDAGE, COTTON, ELASTIC

Figure 4-5. Bandages for field use.

CHAPTER 5

SPECIFIC WOUNDS AND BURNS

5-1. Classes of Head Injuries

Head injuries are of two main classes, open wounds and closed wounds. They are further classified as scalp wounds, skull fractures, intracranial wounds, and wounds of the face.

5-2. Scalp Wounds

a. Laceration of the scalp may result in a gaping wound with profuse bleeding. The wound is gaping because of the tension of the layers of the scalp. The profuse bleeding is due to the rich blood supply. Firm pressure dressings will control bleeding of the scalp.

b. Contusions resulting from blows to the head may form lumps in the scalp. These are usually collections of blood caused by broken blood vessels within and under the scalp. Contusions require no specific treatment by the aidman in the field, but all head wounds should receive careful examination and constant observation. A patient may have no complaint other than a slight headache immediately following the injury, even though serious intracranial damage may exist.

5-3. Skull Fractures

Cranial wounds are skull fractures. A skull fracture may be a simple line break or crack in the skull bone, or it may be a depressed fracture with pieces of the skull penetrating the brain. A simple skull fracture in itself is not serious as the bone will heal fairly rapidly. The danger is that the blow which caused the fracture also ruptured blood vessels under the skull, causing blood to collect and increase pressure on the underlying brain tissue.

a. Generally, you will be unable to determine whether a skull fracture is present or not. Sometimes the fracture can be felt through the scalp, but most skull fractures will not be proven until X-rays are taken. Consequently, you should suspect skull fracture in any patient who received a severe blow to the head, even if the scalp was not lacerated. If you see clear fluid coming from an ear, the nose, or a head injury, or if you see brain matter in any head wound, you can be sure a skull fracture is present. In

addition, pupils of unequal size and vomiting are signs of brain injury even if the skull is not fractured.

b. Do not give medication to a patient with a head injury. The medication may mask the symptoms of a more serious injury. Observe the patient carefully, paying particular attention to his vital signs and state of consciousness.

c. Routine evacuation is indicated for simple head injuries if there is no firm evidence of skull fracture and the vital signs and state of consciousness are stable.

d. If you can feel a fracture, or if you see the clear cerebrospinal fluid coming from the patient's nose, ears, or wound, or if you see brain matter in the wound, or if the vital signs or level of consciousness deteriorate, evacuate the patient by the proper category of precedence. In this case, that would be probably priority or urgent. If an external wound is present, apply a loose-fitting dressing. Again, give no medication.

e. The most important thing you can do in the treatment of head wounds is record the injury. Record the time of the wounding and all signs and symptoms. Make particular note of vital signs, size of pupils, and state of consciousness both when you first began treatment and at the time of evacuation. Also record the time of your observation.

5-4. Intracranial Wounds

Intracranial wounds are serious because they involve the brain and other tissue inside the skull. There are two general types of intracranial wounds, open and closed. In the open type, the brain is exposed to the outside and there is a laceration of the scalp as well as a skull fracture. In the closed type, there is no opening from the brain to the outside. Either type will pose problems for you. For a severe open head wound, you should apply a dry, sterile dressing and call for immediate evacuation using the urgent category of precedence. The closed head wound poses special problems. You have no immediate way to determine the degree of injury. Therefore, you should do the following things:

a. Observe the patient closely.

b. Record the time of the injury.

c. Check the patient every few minutes for headache, changes in size of pupil of the eyes or in their reaction to light, impairment of vision, dizziness, slurring of speech, changes in pulse rate, vomiting, or changes in rate of respiration. Be sure to record these symptoms and the time of their onset. They indicate that brain injury is developing, usually from slow bleeding inside the skull. Always record at least one observation of pupil size and pulse rate in case of a head injury.

d. Request a priority category evacuation for the patient if any of these symptoms appear.

e. Advise the patient's commander not to plan on using the patient for critical or sensitive duties while he is being observed.

f. Give no medication during the period of observation. Observation should last about 24 hours. Occasionally the bleeding inside the skull can be very slow, with the symptoms taking several days to develop. The patient's commander should be alerted to this possibility.

5-5. Wounds of the Face

Facial wounds require prompt, positive action because of bleeding and possible airway obstruction. Airway obstruction is a more immediate threat to life and harder to handle than bleeding. Blood clots and pieces of bone, flesh, or other foreign material may block the airway. Blood which is swallowed may cause vomiting and the vomitus may be aspirated, further complicating the problem. Attempts to control bleeding may interfere with breathing. The patient may be trying frantically to get air. Do these things immediately.

a. Position the patient so that he will not aspirate fluids if he is bleeding from the mouth or vomiting.

b. Clear the airway of blood clots and foreign matter. Wrap a piece of gauze bandage around your fingers when you dislodge blood, vomitus, or mucus from the airway. Gauze makes it easier for you to grasp things.

c. Prepare to perform an emergency surgical airway. Due to aspiration of foreign matter, the patient will be hard to manage and he will remain in danger of aspirating more foreign matter until bleeding is controlled. It may become necessary to perform an emergency surgical airway (para 3-10) to relieve airway obstruction before full attention can be turned to control of bleeding from the facial wound.

d. Call for evacuation early. Facial wounds become progressively worse. Airway difficulties get worse with swelling of injured tissue. Bleeding is hard to control, injured tissue becomes more painful, and it is almost impossible to prevent infection. Collect all pieces of dentures, if any, and evacuate them with the patient. They can be valuable aids in treatment and reconstruction.

5-6. Wounds of the Neck

Wounds of the neck are treated essentially the same as facial wounds. Airway obstruction and hemorrhage are the main threats to life. Hemorrhage from large blood vessels must be controlled quickly. Direct pressure with a pressure dressing must be applied

over the bleeding point, alongside but not over the trachea. Take these actions or precautions immediately.

Caution. Beware of a possible fracture!

a. Position the patient quickly to prevent more blood from entering the airway.

b. If large blood vessels are severed, apply direct pressure quickly.

c. Call for assistance; the patient will be difficult to handle.

d. Clear the airway as rapidly as possible. Consider a surgical emergency airway early.

e. Due to aspiration of large amounts of blood, the airway may be blocked. After clearing it, start artificial respiration if spontaneous respiration does not occur.

f. Call for evacuation early and request delivery of necessary resuscitative equipment.

g. In severe hemorrhage, start blood volume expanders promptly.

h. Handle the patient very gently if you suspect he has a fractured neck. Immobilize the neck as much as possible.

i. Do not give morphine.

j. Do not give anything by mouth, as the esophagus may be injured.

5-7. Chest Wounds

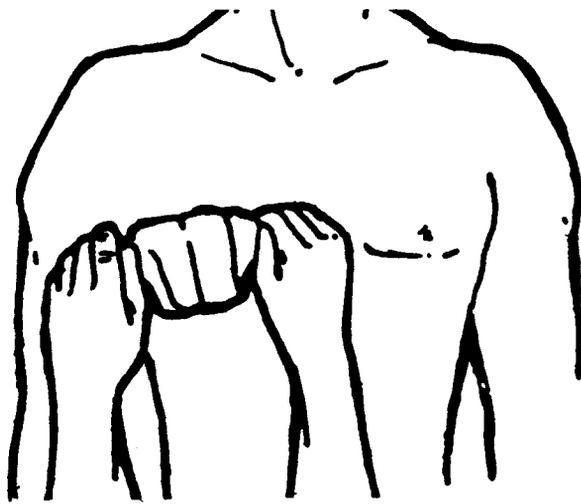
Chest wounds represent an appreciable proportion of combat wounds. Most fire is directed toward the chest. Penetrating and perforating wounds of the chest may damage the lungs, trachea, bronchi, esophagus, diaphragm, or large blood vessels. Most chest wounds interfere with breathing.

a. The normal chest cavity is an airtight enclosure with one opening to the air, the trachea. If another opening into the chest cavity is made, such as a bullet wound through the chest wall, the lung on that side of the chest can no longer remain expanded and is said to "collapse." With each breath, air is sucked into the chest cavity, permitting the lung to deflate further. This is called a "sucking chest wound." The more the lung collapses the less well the patient can breathe. Therefore, the sucking chest wound must be *sealed* shut as soon as possible by any means available.

(1) The best way is to place several thicknesses of petrolatum-impregnated gauze over the wound and reinforce it with a field dressing, as in figure 5-1.

(2) A field dressing (first aid dressing) may be placed over the wound. Then, the dressing should be covered with airtight material to produce a quicker airtight seal over the wound.

(3) A piece of airtight material such as cellophane, plastics,



PETROLATUM GAUZE OVER SUCKING
CHEST WOUND



DRESSING OVER PETROLATUM GAUZE

BANDAGE OVER GAUZE



Figure 5-1. Treatment of a sucking chest wound.

or poncho placed directly over the wound is effective as long as it is held firmly in place. These materials tend to slip and leak as blood seeps under them.

(4) All sucking wounds must be sealed. The test of successful sealing is in the patient's ability to breathe easier and the cessation of bubbling or hissing at the wound during respiration.

b. Flooding of the chest cavity by internal bleeding can also collapse the lungs. If all wound openings are closed and the patient still has difficulty, you can assume he has internal bleeding or massive lung damage. If the patient begins to present a shock picture, internal bleeding should be suspected. If he begins to hemorrhage from the mouth, he is critical. Then, the following measures are used.

(1) Place the patient in the best breathing position. If possible, the wounded side should be placed down to increase breathing of the unwounded side.

(2) Start intravenous infusions of Ringer's lactate solution or other blood volume expanders.

(3) Keep the patient as still as possible.

(4) Urgent evacuation is indicated.

5-8. Abdominal Wounds

A wound of the abdomen can be misleading. What appears to be a small, insignificant wound on the outside may be a massive, bleeding wound on the inside (fig 5-2). All penetrating and perforating abdominal wounds require exploratory surgery to stop bleeding. Abdominal wounds may include damage to the stomach, pancreas, intestines, spleen, liver, kidneys, or large blood vessels. The early cause of death is uncontrolled bleeding. Infections, especially those of the internal abdominal lining (peritonitis), caused by injury to the intestines or by the wounding agent itself, may complicate the case later.

a. *Signs and Symptoms of Internal Abdominal Bleeding.*

(1) Any perforating or penetrating abdominal wound.

(2) Pale skin and weak, rapid pulse.

(3) Thirst, restlessness, and apprehension.

(4) Abdominal rigidity (board-like).

b. *Actions You Should Take Immediately.*

(1) Instruct the patient to remain as still and quiet as possible.

(2) Call for urgent evacuation.

(3) Start intravenous infusions of Ringer's lactate solution or some other blood volume expander.

(4) If the patient's organs are protruding, do not try to replace them.

any of these devices can amputate an arm or a leg. High velocity bullets can cause a partial amputation. In treating a patient with a traumatic amputation, you must do these things immediately.

a. Expose the entire limb above the wound by removing or cutting off the clothing. Inspect to confirm the extent of damage to remaining tissue.

b. Apply a tourniquet at once. Often, if the entire extremity is completely torn off, bleeding will be slight. This is due to the partial retraction of arteries and contraction of muscles acting like a tourniquet. Even if bleeding is slight, apply a tourniquet because, in a few minutes, the muscles will relax and bleeding will start.

c. The best field tourniquet is made with a cravat bandage and a stick. As in figure 5-3, place the tourniquet about 2 inches above the end of the stump or incomplete amputation. Tighten the tourniquet until all bleeding stops. Secure the tourniquet (fig 5-3) so that it is easy to remove or to tighten.

d. Cover the stump or incomplete amputation with field dressings. The dressings keep the wound clean and gives you a visual check on bleeding. If the dressing becomes soaked with blood, check the wound or inspect and adjust the tourniquet. Do not apply a roller bandage at this time; it would interfere with the tourniquet.

e. If the amputation is incomplete, put a splint on it. The tissue splinted should be positioned in approximate anatomical alignment to avoid further damage to splinted parts of the limbs. Tissue below the probable amputation can be saved sometimes and used later in making the stump. A temporary improvised splint that is easy to remove is adequate. Apply the splint so that the tourniquet can be adjusted without much trouble.

f. At first, the pain should be slight to moderate. Severe pain may develop later, in 30 minutes to 2 hours. Morphine is not indicated unless the pain is severe.

5-10. Burns

Burns are damage to tissue caused by exposure to excessive heat, strong chemicals, or electricity. They are classified by cause, degree, and extent. All classifications should be considered in the treatment and disposition of a burn patient. Burns are complicated by airway blockage, carbon monoxide poisoning, lung damage, shock, and infections. Most people who die immediately in a fire die from suffocation. Those who die a few hours later usually die of shock. Those dying 3 to 10 days after the burn usually die of infection. Other factors complicate burns but you can do little in the field to prevent them. Your first job is to treat those life-threatening conditions which follow burns.

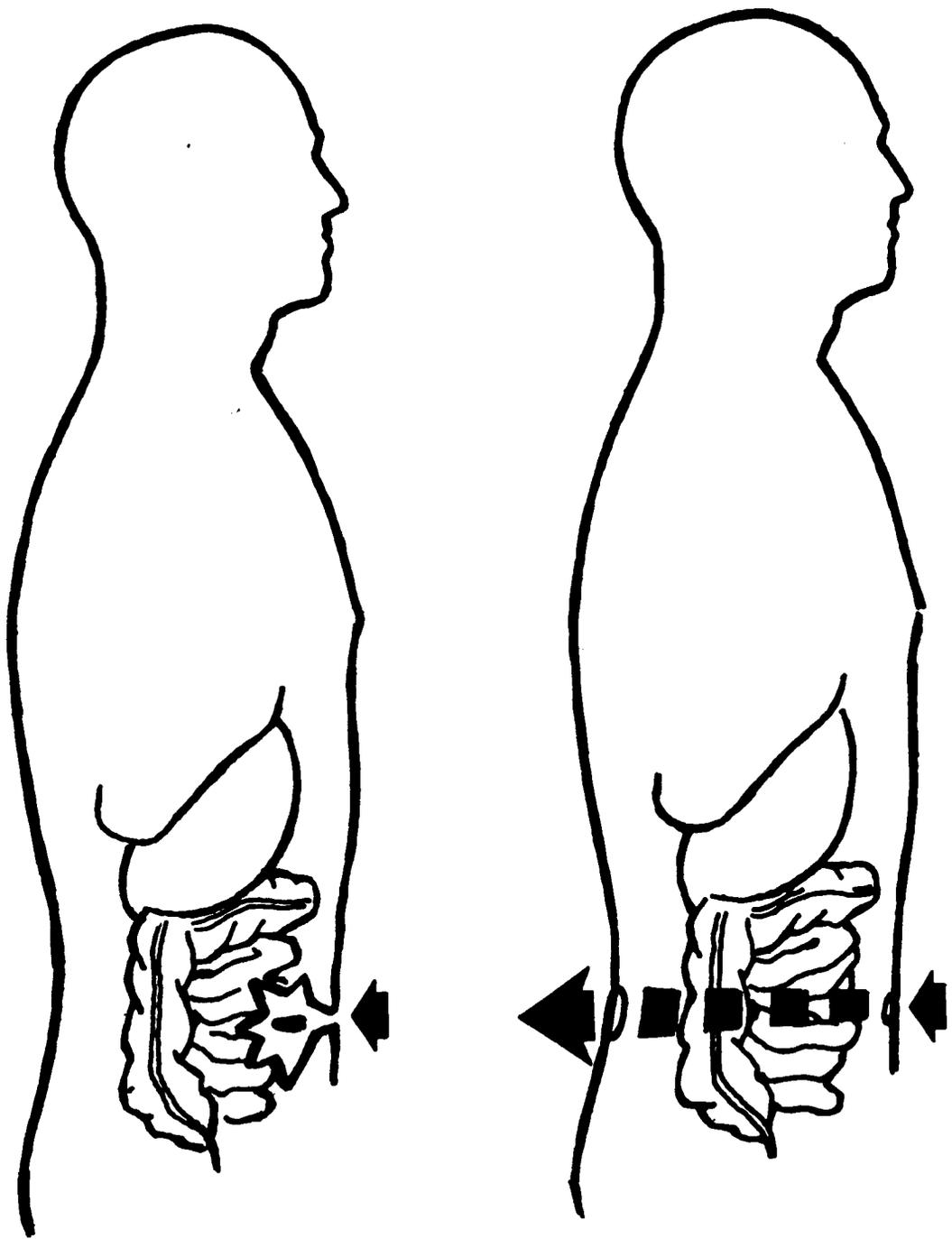


Figure 5-2. Abdominal wound.

(5) Cover the wound loosely with a dry sterile dressing.

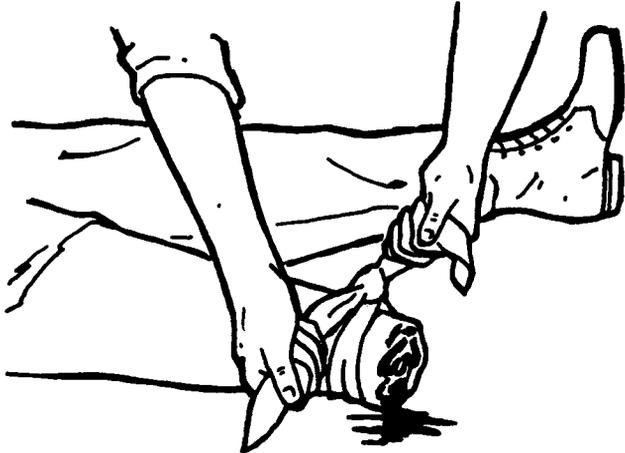
(6) Allow the patient to take *no* food or drink by mouth.

Give no oral medication.

(7) For a closed abdominal wound (blunt trauma), give no medication for pain because it might disguise the symptoms needed for diagnosis. If the wound is open and there is no breathing trouble or head injury, morphine may be given by injection for pain.

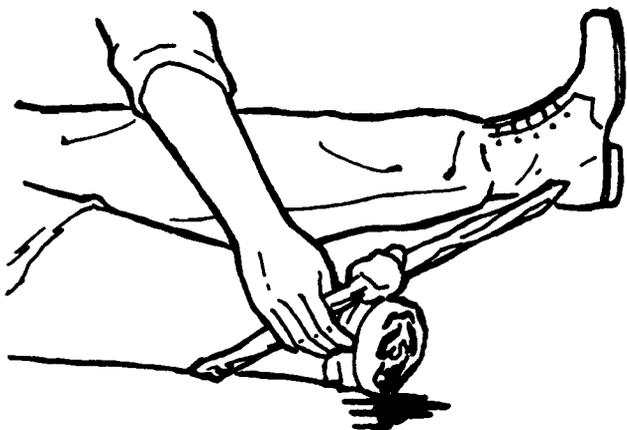
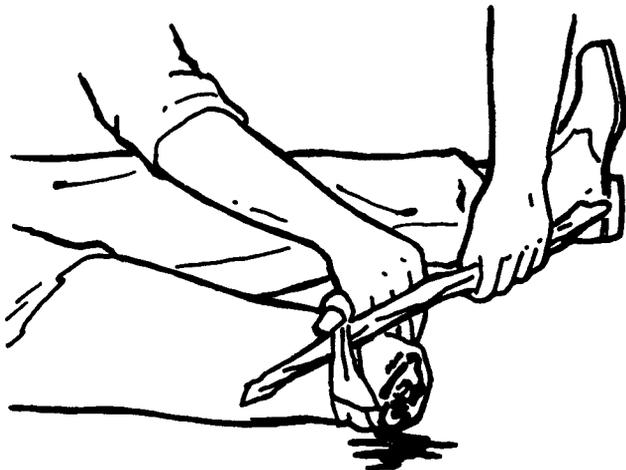
5-9. Traumatic Amputations

Most traumatic amputations are caused by exploding antipersonnel mines, land mines, and booby traps. Fragments thrown out by



APPLY TIE TWO INCHES ABOVE WOUND.

INSERT STICK



TURN STICK UNTIL BLEEDING IS CONTROLLED.

SECURE STICK.

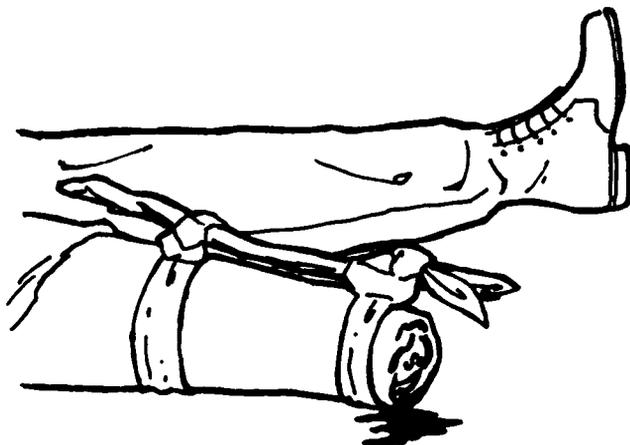


Figure 5-3. Application of Spanish windlass tourniquet to a traumatic amputation.

a. Airway difficulty and carbon monoxide poisoning are the most immediate threats to life. These conditions may have several causes.

(1) Edema of the tissue of the air passages is due to burns from inhaled hot gases. Swelling of the lips and mouth indicates other tissues farther down the airway are probably swollen. This swelling may block the air passages and suffocate the patient. An emergency surgical airway is then indicated. The surgical airway should be made before the air passages are completely closed.

(2) Inhalation of carbon monoxide is a threat even if the patient is not burned. Burning material consumes oxygen and produces carbon monoxide, a poisonous gas. A patient who has inhaled carbon monoxide will exhibit a sensation of suffocation, cherry red flush, and possibly coma. If the patient inhales carbon monoxide, you may need to perform artificial respiration for prolonged periods of time. Also request the evacuation vehicle to bring oxygen and resuscitating equipment to supplement treatment.

(3) Smoke inhalation irritates the air passages and delicate membranes of air sacs in the lungs and can result in a form of pneumonia. When the patient has inhaled such irritation or poisonous material, his lungs must be flushed out with fresh air or oxygen as fast as possible. If the patient is conscious, he can flush the fumes out himself by deep breathing and coughing. If he is unconscious or uncooperative, artificial respiration should be given to force deep breathing. Request the evacuation vehicle to bring resuscitative equipment for use in supplementing treatment. Artificial respiration also will be needed if the patient does not breathe on his own.

b. Shock is another serious threat to life in a burn patient. When extensive areas of skin are burned, the patient cannot properly control loss of body water. If 30 to 40 percent of the body surface receives second or third degree burns, the body will lose 6 to 7 liters of water in 24 hours. If this tissue fluid is not replaced, shock is certain to occur. Since tissues begin to lose fluid as soon as a burn occurs, the sooner fluid replacement is begun, the better. Fluids may be given orally or intravenously. If large areas of the body are covered by second or third degree burns, you should start two or more I.V.'s. Use fluids as directed in paragraph 3-12. Ringer's lactate solution is the best I.V. and may even be given orally if tolerated. To prevent burn shock, start fluid replacement early, both orally and intravenously.

c. Infection is the third cause of burn deaths. It is a late complication, but the organisms causing the infection may enter early after the burn. You should take every reasonable precaution

to prevent this. Apply only dry, sterile dressings over the burn. If you do not have dry, sterile dressings, leave the burn open. Do not cough or sneeze over the burn. Do not pass your hands over the burn any more than is necessary. Do not place a blanket over the burn patient unless the weather is extremely cold. Do not apply medication to a burn. It does little good and when it is removed it will cause the patient much pain. In particular, do not apply greasy substances such as butter, olive oil, or suntan lotion as these will predispose to infection and do no good. The only material presently acceptable for application to the burn surface besides the dry sterile dressing is Sulfamydon burn cream.

5-11. Chemical Burns

Acids, alkalis, and other strong chemical agents damage the skin, causing chemical burns. A common chemical burn is that caused by white phosphorus, a fast-burning metal used in marking rounds and incendiary grenades. When detonated, the white phosphorus is blown into small pieces. Each particle of phosphorus burns rapidly when exposed to air. Particles striking a soldier will imbed in or stick to his skin and clothing and continue to burn. His clothing may ignite, causing more burns. The only way to stop the phosphorus from burning is to exclude the air (oxygen) from it. Copper sulfate pads are designed to extinguish burning phosphorus. Apply water to the copper sulfate pads and place over the burning phosphorus while wet. If the pad dries out, apply more water; the pad must be kept wet. If you do not have copper sulfate pads, mud is a good substitute. You can wet gauze, but it must be kept wet or it too will ignite, producing more burn. As soon as the phosphorus is extinguished, remove the particles if they are not imbedded too deeply. After removing the particles, cover the burn with a dry, sterile dressing. *Never* use copper sulfate pads as a dressing. If you cannot remove the particles, notify the evacuation vehicle so that additional copper sulfate may be brought for in-transit treatment. For safety of the evacuation vehicle, all patients with white phosphorus burns must be monitored carefully, because a burning piece of phosphorus may ignite the evacuation vehicle. Other chemical burns must be flushed with water to wash away the chemical, then treated as any other burn.

5-12. Evacuation of Burned Patients

To determine category of precedence (para 2-8) for evacuation, you need to know how to classify burns according to their severity. Severity classifications are minor, moderate, and severe. The severity of a burn is determined by the extent of the burn and the degree of the burn. Extent means area. Degree means depth. Burns about the head, face, neck, or chest are severe and the

patient with such burns should be evacuated in the urgent or priority category because of possible airway complications.

a. Minor burns include first degree burns of any extent and second degree burns of small area. Moderate burns include second degree burns of less than 10 to 20 percent of the body surface and small third degree burns. Severe burns are those in which 20 percent or more of the body surface is covered with second or third degree burns. The "rule of nine" is useful for calculating percent of body surface burned. Roughly, these are the portions of body surface over each part of the body: head 9 percent, each arm 9 percent, anterior trunk 18 percent, posterior trunk 18 percent, each leg 18 percent, groin 1 percent.

b. A first degree burn is one where there is a reddening of the skin as in sunburn. A second degree burn is one with blistering of the skin. A third degree burn is one with charring or complete destruction of tissue. At times, in the absence of charring it may be difficult to determine if a third degree burn is present. Some third degree burns have the appearance of leather, or horsehide as on a baseball. As third degree areas have lost their nerve supply, they are insensitive to pain.

c. As a general rule, patients with minor burns should be evacuated in the routine category. Frequently, they need not be evacuated at all. Moderate burns should be evacuated in the priority category. Severe burns should be evacuated in the urgent category.