

Death

When a person subject to or within an area of military jurisdiction dies, an investigation is made to learn if a criminal act contributed to the death. Only when a person dies from natural causes while under medical attention is this not done.

You may be called on to assess the facts of violent deaths. It is important that

these deaths be looked into properly. To tell if a death is homicide, suicide, or accident requires skill, training, and experience on your part, and the technical expertise of examiners at a crime lab. Criminal blame, if present, must not be overlooked. But if the death was accidental, unjust criminal charges must not be brought against innocent persons.

RESPONSIBILITIES AND COORDINATION

Many agencies are responsible to the commander for investigating suspicious deaths. Close liaison must be made within commands between investigative, medical, and related forensic personnel for effective death investigations. Matters of mutual

interest include jurisdiction; investigative responsibilities; local agreements with the civil authorities; status of forces agreements; and rules to be followed by MP, USACIDC, medical personnel, and pathologists.

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The provost marshal office and USACIDC are responsible for obtaining all facts pertinent to deaths occurring under suspect conditions. As an investigator you must determine the manner of death to be a homicide, a suicide, or an accidental or natural death. If the deaths were accidental or homicidal, you will investigate to identify the persons responsible.

The medical officer, often a specialist in pathology, determines the medical cause of death. You must cooperate fully with medical personnel and pathologists. They will work with you to learn the identity of the deceased and the approximate time and manner of death. They may depend on you to help them determine the cause of death.

You are encouraged to setup a liaison with the pathologist who does the autopsy. You must tell the pathologist of the known facts of death and initial investigative findings prior to the autopsy. This enables the pathologist not only to select proper ways to determine the cause of death but also to give an opinion about the manner of death. The medical officer must also complete certain military records and official certificates of death. You work with the medical officer to collect and preserve evidence. This includes obtaining at least two sets of major case prints from a

deceased to compare with latent prints found at the death scene. You will also direct photography.

The line of duty (LOD) investigating officer determines the duty status and personal conduct of the deceased. The LOD officer has no jurisdiction with the criminal investigation. The safety officer determines the safety factors or lack of them in an accident. His or her interest in accidents is limited to safety.

Close intelligence liaison is needed and directed by AR 195-2. A report of death due to homicide, accident, or suicide must be relayed at once to the nearest intelligence agency. If the victim had access to classified material, ask the intelligence officer to find out if any of this material is missing. The intelligence officer is responsible for security measures. His or her main concern is to insure that classified material is not compromised. This is very important if the death is a suicide. Ensure that intelligence officials are kept fully advised until no further security interest exists.

In some instances, the post commander or higher authority may call a board of inquiry to find out the facts connected with a death. Such a board has broad powers and may check into all areas of the matter.

MEDICOLEGAL AUTOPSY AND POST MORTEM CONDITIONS

A medicolegal autopsy is authorized or ordered by authorities in all cases when a death is unattended. Generally, autopsies on persons who were subject to the UCMJ are done by military pathologists. Other autopsies are done by civilian pathologists on request or order of civil authorities. Procedures may differ overseas in areas over which US commanders have authority.

In a medicolegal autopsy special emphasis is placed on identifying the victim by photograph, fingerprint, dental and medical records, and/or next of kin. Final assessment of the cause and manner of death is made only after a complete medicolegal investigation reviews autopsy and toxicologic tests.

During the autopsy, you and the pathologist exchange facts and views to learn the circumstances and mechanism of death. You discuss with the pathologist all known facts, considerations, and information. You should be present at the autopsy to answer questions and to receive evidence or specimens taken from the victim. If the pathologist's findings are not understandable or if they seem to conflict with known facts, discuss them with the pathologist before he releases the body from medical control. An early and important concern that you and the pathologist consider when checking the location and character of wounds is whether or not the victim could possibly have caused the wounds to himself.

INFORMATION AN AUTOPSY MAY PROVIDE

- Estimated time of death.
- Type of blood.
- Cause of death and determination of which wound was fatal.
- Type of weapon or substance used and manner of use.
- Time interval between receiving wounds and death and if the victim was able to move.
- Drug and/or alcoholic content in the blood.
- Evidence of sexual assault, pregnancy, venereal disease.
- Opinions as to manner of death.

Take precise measurements of the body, site, number, shape, edges, and extremities of wounds. X-ray the wounds for trace evidence (metallic fragments). Also look for defense wounds. Determine the depth and direction of each wound. But remember, *never place an object in the wound*. Check all wounds carefully and collect trace evidence like glass, hair, and fibers. You may be able to tell which wounds were fatal. Collect samples for toxicologic tests. Note medical and other artifacts like embalmer's wounds or prosecutor's slips of the knife. Document all inner and outer scars. Check all wounds for multiple thrusts. Document your findings with photographs, drawings, and charts.

The presence of postmortem conditions in the body, as they were found and noted by you at the crime scene, are important to the pathologist as well as to you. You must be sure to mention them to the person doing the autopsy. Post mortem conditions to be looked for include low body temperature, liver

mortis, contusions, bleeding, and rigor mortis. They also include the conditions of putrefaction, adipocere, mummification and consumption by insects and animals.

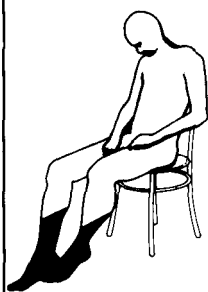
LOW BODY TEMPERATURE

After the vital functions of the body have ceased, body temperature adjusts to environmental temperature. It may be possible to learn the approximate time of death by the rate of heat loss and the temperature of the area where the body is found. When body temperature falls, the amount of heat loss depends on factors which can slow or speed the loss of heat. Age, size, weight, clothing, and environment all affect heat loss. At a temperature of 70° Fahrenheit, the average body temperature drops 1.5 degrees per hour for the first 12 hours.

LIVOR MORTIS

After death blood settles toward the lowest part of the body. This causes a reddish-purple discoloration called liver mortis, or postmortem lividity. It is often seen within one-half to two hours after death. The hue of the liver mortis may give some sign of the cause of death. For example, a bright cherry-red hue may suggest carbon monoxide or cyanide poisoning. Inconsistent distribution of the liver mortis may suggest that the body has been disturbed. For four to six hours after death, slight pressure to the skin stops the flow of blood settling in nearby vessels. This results in blanching in that area. After the condition is set, moving a body no longer changes the distribution of it. If the distribution of liver mortis does not conform to the body's position, then the body may have been moved after the condition set.

PATTERNS OF DISCOLORATION SEEN IN LIVOR MORTIS

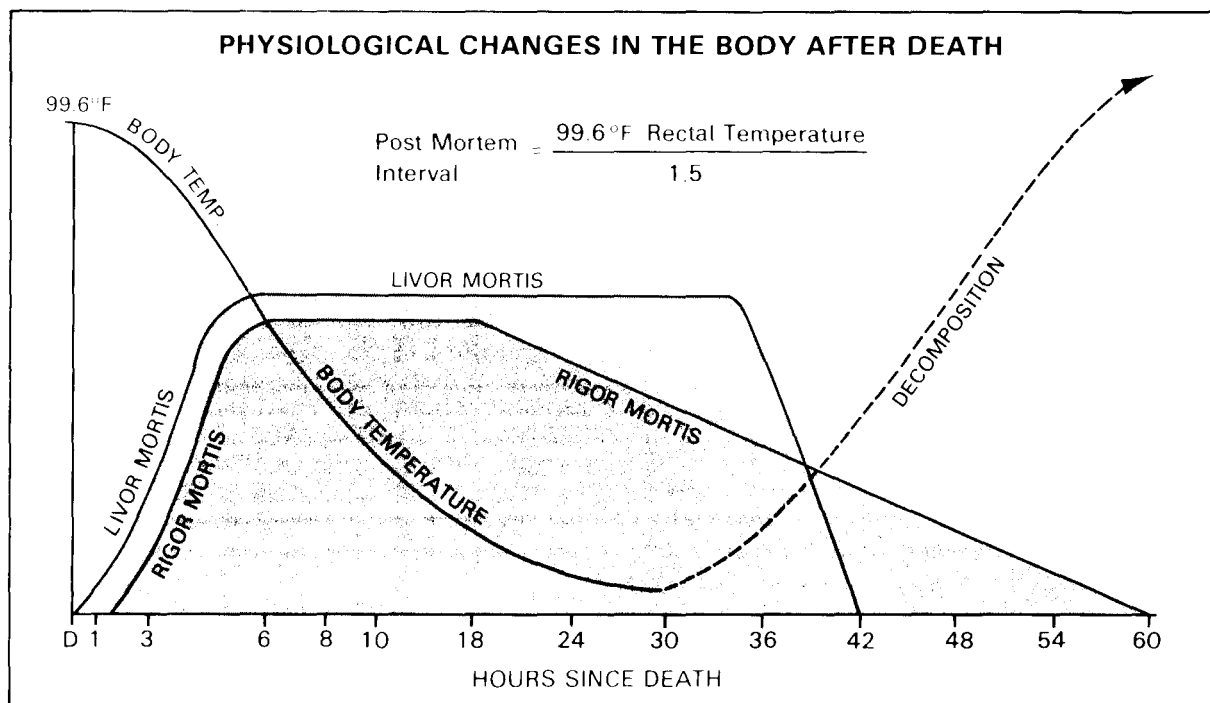


The distribution of livor mortis is consistent with the pull of gravity. Blood settles toward the lowest parts of the body. If the body is seated at death, the reddish-purple discoloration may be expected to appear in the feet, lower legs, hands, and chin. If the body is lying flat, the discoloration is likely to be along a horizontal plane.



Areas of blanching appear within livor-darkened portions of the body where body weight and bone structure have compressed body tissue against an outside surface, closing blood vessels and keeping the blood from settling into the compressed area.





To record information about the livor mortis, take photographs and exact measurements before the body is moved. Note folds in clothes and positions of belt, buttons, jewelry. Look for anything which could have exerted pressure on the body.

CONTUSIONS

A contusion, or bruise, is a localized hemorrhage within the body. Bruises are caused by blood spreading under the skin. They can result from a blunt impact or from fractures or torn soft tissue like ligaments and muscles. They also may be caused by indirect trauma like twisting or falling. A recent bruise is very dark red, reddish-purple, or blue. The color of it is uniform. In a day or so, a yellowish margin appears. Later it changes from green to brown and then to brownish black. You should photograph bruises with a color scale. Try to have a medical officer estimate the age of the contusion.

BLEEDING

The presence and location of blood are important. When the heart stops, blood pressure drops to zero. Thus when injuries are seen, especially to the head, and there is no sign of blood or bleeding, the injuries may

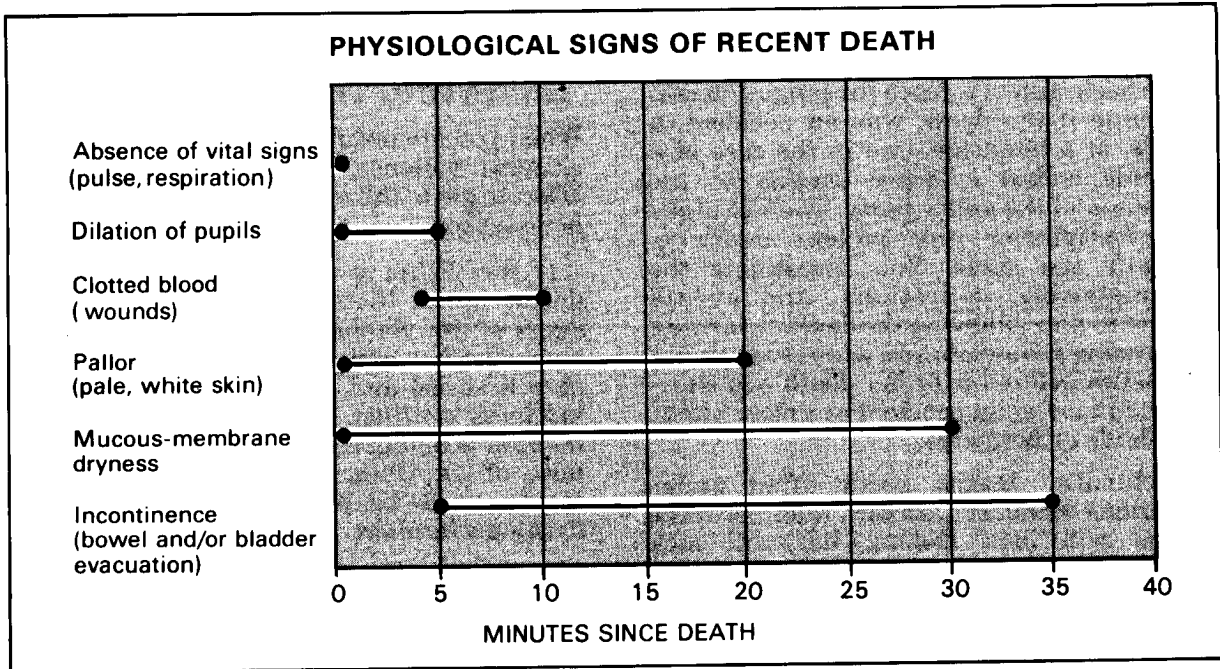
have occurred after death. Sometimes wounds made after death on the underside of a body may show blood, but this is from blood draining down and out of the body from the influence of gravity. You should note the amount, color, degree of coagulation, size of area covered, and types of surface on which the blood rests.

RIGOR MORTIS

Rigor mortis is a rigidity of the body caused by muscles contracting after death from chemical changes within muscle tissue. It starts in all muscles at the same time. But it is first noticed in the small muscles of the face, neck, lower jaw, hands, and feet. Its time of onset and completion depends on environmental conditions and the onset of decomposition. The rigor can be broken. For example, a leg may be straightened out, but it takes a lot of effort. If the rigor is broken after it has fully set, it will not return.

PUTREFACTION

Putrefaction is a slow decomposition of the body. It is a chemical and bacterial change. It starts at death and continues until all soft tissue of the body is consumed. Temperature is important to the speed with which it



happens. Heat speeds bacterial growth and action, while cold slows it.

One of the first signs of putrefaction is a greenish staining in the lower abdomen. The change slowly spreads and takes on a brownish look. Sometimes the skin gets so dark, it may be hard to determine race. The condition called marbling comes from bacterial action on blood in the veins. They become dark red or purple and stand out lightly on the skin. And as bacteria acts on inner organs, gases form. They bloat the body, and facial features become vague. Putrefaction goes on until the body is consumed, unless adipocere or mummification begins.

ADIPOCERE

Adipocere is a yellowish-white substance composed of fatty acids and soaps developed in post mortem changes of the fatty parts of the body like cheeks, abdomen wall, and buttocks. The chemical process is induced by enzymes and water in moist anaerobic conditions in which bacteria need no oxygen to survive. Adipocere has a greasy feel and a strong and musty odor. Although adipocere may cover wounds, the wounds can be seen in a close examination even when the process has advanced.

MUMMIFICATION

Mummification occurs when body tissue dehydrates. The skin takes on a leathery look. The process only occurs in hot, dry climates, free from the moisture needed by bacteria. Mummification is more likely to occur in infancy than at later ages. The bodies of infants who die soon afterbirth are sterile. They do not have internal bacteria. Thus bacterial action is slowed because all bacteria must enter the body from outside. And, because of their size, the drying process can be completed faster in infants than in adults.

CONSUMPTION BY INSECTS AND ANIMALS

Insects and animals may begin to consume a body soon after death. Flies, maggots, and beetles attack open areas of the body. They gather on soft body tissues. Sometimes an entomologist's study of insect larvae on a body can help estimate time of death.

Cats and dogs locked in a room with a body eventually will eat a human body. A body buried in a shallow grave often is dug up by animals for food. It is not unusual for bodies left in woods to have their parts scattered over a large area by animals.

INVESTIGATIVE ACTIONS

The basic aim of a death investigation is to determine if the death was an accident, a suicide, or a homicide, and in the case of a homicide collect evidence leading to the conviction of the guilty party. The technique of investigating any violent death is basically the same. You investigate the circumstances, conditions, and events leading to and following the death. Learning and tracing the events and actions involving the victim before his or her death can show the likelihood of an accident or a clear intent for suicide or homicide.

Accidental deaths occur often under conditions which are suspect. Many of these deaths will look violent, but will lack criminal likelihood. Circumstances may show a logical reason for a weapon's presence and if there was a chance for an accident.

On the other hand, circumstances may strongly suggest death by suicide. Prior suicide attempts and earlier written or oral statements of intent, as well as suicide notes at the scene, are strong evidence of suicide.

Homicide, too, is often shown by conditions and events leading to and following the death. A disturbed scene, wounds to nonvital areas, punctured clothing, no weapon at the scene, no signs of suicidal intent or hazardous conditions, lack of hesitation wounds, signs of a fight, and signs of flight or surprise are all factors pointing to homicide.

The lack of a visible weapon at the scene most often suggests that the death was homicidal. But a suicide victim may live long enough to dispose of a weapon. Or he or she may arrange a contraption to cause the weapon to disappear after being fired. And relatives fearing social disgrace or having an interest in a suicide's life insurance may try to hide the deceased's suicidal intent and circumstances. Similarly, a murderer may try to make things to look like a suicide or an accident. When distinguishing between suicide and homicide, it is very important that motive be learned. Opportunity is also a factor to be considered where there are signs that an apparent or alleged suicide may be a homicide.

INITIATING THE INVESTIGATION

When you are notified of a death or an act of extreme violence, make every reasonable effort to get to the scene and secure it before it is disturbed.

If the victim is still at the scene and a doctor is not there, immediately check for signs of life. *Saving a life* takes precedence over all other actions. If the victim is alive, give first aid and have the proper medical authority notified. If the victim seems likely to die or is dying, try to get a statement. Make note of anything which may permit the statement to be admissible evidence as a *dying declaration*.

You must ensure that the scene is not contaminated. Curious onlookers can cause problems at a death scene. If the victim is still alive, onlookers can destroy evidence while attempting to help you. If the victim is dead they can destroy evidence by trying to cover the body. In either case they can deposit materials that may be mistaken as evidence. When you arrive on the scene have all unnecessary persons stand back from the immediate area.

Be sure the identities of all persons at the scene are verified. Learn the identity of the person who found the victim or who was first on the scene. Also identify the person who made the report. Process the crime scene with great care, using the steps you have learned for crime scene processing. Be sure to record the time you arrived. Also note the exact address, the temperature, and the weather. You will need this information for your investigation and for future legal proceedings. Without this information, your later testimony may be vague. This could cause the value of the rest of your testimony to be minimized.

CHECKING FOR WOUNDS AND ESTIMATING TIME OF DEATH

You must check the body for external wounds or injuries. If a pathologist is with you, he can make a detailed description of the body site, direction, and measurements of the

injuries. It is desirable for a medical officer or pathologist to take part in the exam at the scene to note condition of the body, postmortem changes, environmental conditions and circumstances of death. Depending upon the conditions, a medical officer, especially a pathologist, can often give an opinion about the time of death. When certain control factors, such as climatic conditions and time of exposure to the elements, are known, a medical officer may give a broad estimate of the lapse of time since death. This is based on rigor mortis, liver mortis, loss of body temperature, and the state of putrefaction of the remains. Changes in brain, rectal, and liver temperature can be used to estimate time of death, but they are not always reliable. A search of stomach contents may be of value. Remember, the estimation is very broad; so its significance may be negligible to the investigation. Later you can match these findings at the scene with autopsy findings to determine the manner of death.

Slight abrasions may be the only outer signs of severe internal injuries. Or they may suggest the manner of death. Small fingernail marks and abrasions on the neck are notably important to manual strangulation cases. Likewise, slight abrasions of the nose, mouth, and neck, especially of infants, receive special attention. These marks may point to asphyxia by smothering. Similarly, abrasion and bruising of the thighs, especially on the inner side, raises the suspicion of rape. In many cases, abrasions and bruises are caused by the same force. They may obscure each other to some degree.

If a bullet, a blade, or other weapon passed through the victim's clothing, obtain the clothes and forward them to the lab for analysis. If possible, you remove or help remove them. Place each item in a separate, marked paper bag. If the garments are damp, they should be air dried by hanging in a dry room to preserve the evidence. Clothing should be cut from the body only as a last resort. Do not cut through a *hole* in the garment that might be connected to the cause of death. The pathologist should have the

chance to examine and describe the clothing to match it to injuries on the body.

Dragging a body produces changes in the clothing and the body that can be very confusing if you do not realize the cause. If a body is dragged by the feet, the primary pressure area will be the thorax, and clothes around the thorax will be pushed upward. If the breasts become exposed, particularly on females, dragging will produce numerous parallel superficial abrasions or scratches on the surface. When the surface is extremely rough or contains sharp stones, the abrasions can be deep. If a body is dragged by the shoulders, the clothes of the lower body may be pushed downward. Bruising can be severe if the body is dragged by both shoulders and legs causing multiple abrasions.

These injuries can be distinguished from those of rape or murder by their characteristic parallel, vertical-oriented abrasions. These usually occur on the thorax front or back and on the buttocks. The series of parallel abrasions will be oriented roughly from the head to toe or vice versa. It is always worthwhile to explore these abrasions with a magnifying glass and retain samples of any foreign material that may be present.

Look for metal items, such as pocket knives, watches, rings, cigarette lighters, and belt buckles. They may be separated from the victim. Or they may be mixed with similar objects from other victims. Unless you record the exact place where these items were found, they have little value as identification.

All suspected weapons, shell casings, expended bullets, and the like recovered at the scene or during autopsies must have laboratory tests to identify them and connect them with the death. Release the body only when you are sure it will no longer be needed.

RECONSTRUCTING THE SCENE

Once the victim is removed, you can sketch the scene again, showing the action of the event and the relative positions of pertinent evidence. You may want to have someone role play the victim. Then you can replay the action and record the results with still

photographs or motion pictures to study later. The role player should be about the same height and weight as the victim. This replay of the action can help you learn if or how force was applied. It also may show if an injury was caused in a certain way or from a certain direction. Note circumstance of use and placement and conditions of any weapon.

In alleged homicide investigations it is not unusual to find the body has been removed and the scene returned to its natural state. The body may even have been interred. In cases like this, in addition to reconstructing the scene, closely check records of any other investigations of the death. Seek to establish investigative leads not yet explored. You may need to have the body exhumed for an examination by medical personnel.

Release the scene of a death only when it is certain it will no longer be needed. Early release of a scene often causes the loss of evidence and may preclude a later recheck of the scene.

IDENTIFYING THE DECEASED

The means of identifying bodies are many and varied. Often the highly technical skills of professional medical personnel are needed. Be sure to note the victim's age, sex, race, weight, height, hair color and style, eye color, skin blemishes, and odd dental characteristics. Check metal tags, identification cards, and other documents. If a document seems to have been tampered with or if it has been mutilated or burned, send it to the crime lab for study. Articles of clothing may need laboratory testing and extensive tracing of chronological ownership. Of main concern is the size, type, and condition of the clothing, laundry and drycleaning marks; and foreign substances stuck to the clothing.

Do not completely rely on visually identifying the victim nor on written identifi-

cation and personal items found on a body. Fingerprints are the best means of identification. When you cannot obtain fingerprints, your next best means are dental charts. Medical records of injuries like broken bones or of operations like surgical repairs or removal of parts of the body are also very useful. Scars and tattoos may also help.

CHECKING MOTIVE AND OPPORTUNITY

In homicide cases, if there is no known suspect, or if a suspected or accused person denies being involved, it is very important to identify persons who could have a motive to commit the crime and persons who would have had an opportunity to commit the crime. These two factors are of equal value. Which one you consider first depends on the facts of your case. If you find a person who could have a motive, find out if he or she had the chance to commit the crime. Conversely, if a person seems to have had a chance to commit the crime, find out if he or she had a motive.

The facts surrounding motive and opportunity often surface through questioning. Ask witnesses what they saw. Pay special attention to events that may hint of a motive. Question acquaintances and relatives of the victim to learn of persons who may have had motive or chance. Homicide is often a crime of passion committed by someone well-known by or related to the victim. Ask associates of suspects what they know about the suspects' relationship with the victim. Question the suspects about their relationship with the victim. Find out the whereabouts and the activities of a suspect before, during, and after the incident. Check alibis having a bearing on the chance to commit the crime. Sometimes, to check leads or motives, you may want to conduct a surveillance or an intensive investigation.

DEATHS INVOLVING FIREARMS

Homicides and suicides occur most commonly as a result of the discharge of a firearm. Accidental death from the discharge of a firearm is also common. These violent

deaths often are not witnessed. But unlike other forms of violent or unnatural death, deaths from firearms often have trace evidence left by the weapon in or near the

victim's body. This evidence can be scientifically compared with suspect weapons. And it often can provide information about circumstances surrounding the death.

In a medicolegal investigation of death by firearms, scientific evidence is very important. Deciding the manner of the death, and solving the homicide if there is one, often hinges on that evidence. Thus, you must take every care to ensure such evidence is not lost. For example, gunshot primer residue must always be collected from the victim's hands at the scene if this can be done. The residue is very easily lost when a body is moved. If it cannot be collected at the scene, direct transporting personnel to touch and move the hands just as little as possible.

A study of gunshot wounds in a body can tell much about the type of gun involved. It can identify ammunition, range of fire, and direction and angle of fire. Sometimes it can tell the number of shots that hit the body. And it can give an idea of the fatal or disabling effects of an injury.

BULLET WOUNDS

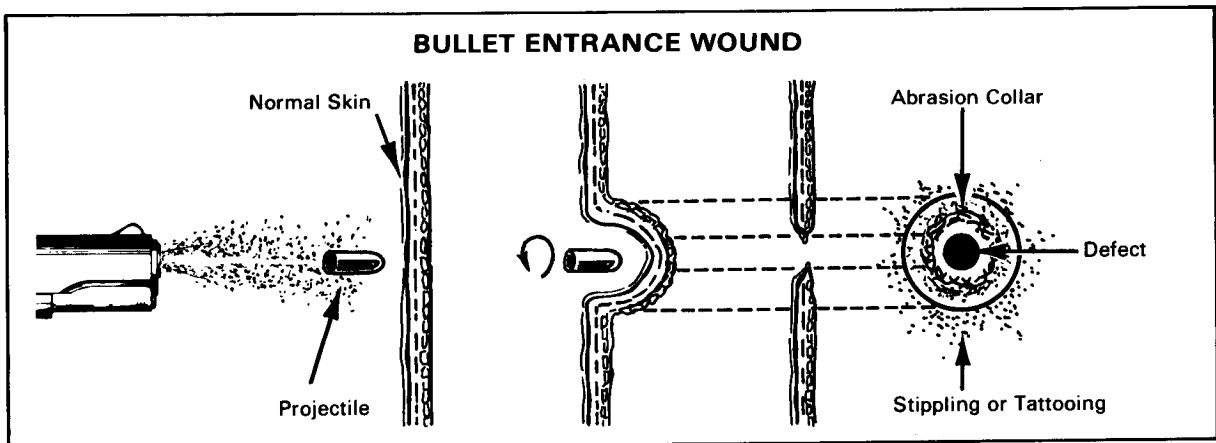
A bullet passing through a body makes a wound which have traits that can be recognized. But all wounds must be medically confirmed during an autopsy. You can usually tell entry wounds from exit wounds. However, sometimes the distinction is hard to make. External determination is hard if bodies have begun to decompose or have been mangled. The uneven surface and tumbling action of ricocheting bullets may

make ragged punctures. Bullets passing across a body can cut gashes that may look like knife wounds. And the energy of a high-speed bullet destroys tissue as the shock waves of its impact radiates away from the bullet. This makes a track of permanently disrupted tissue much wider than the bullet.

In tough cases, inspecting marks and effects on clothing maybe the best way to tell the direction of the bullet's flight. Autopsy examination of the bullet's track may show the path of travel by pieces of cloth, metal, and bone fragments carried forward by the bullet. Metal debris is scientifically detectable by spectrography and X-ray methods. If present, it is heavier at entrance wounds than exit wounds when the wound is in a fleshy area. Also, the nature of bone damage often shows the path of travel of the bullet. And determining which wounds are exit wounds and eliminating them from consideration helps locate entrance wounds.

Entrance Wounds

Entrance wounds are commonly round, regular holes showing minor bleeding. Often, skin resistance is stretched by the impact of the bullet. This makes the hole somewhat smaller than the bullet. Sometimes a narrow ring around the entrance shows grayish soiling from carbon and oils on the bullet and a reddish-brown abrasion collar caused by the bullet's impact. Some bullet entry wounds are inconspicuous or hidden. Such wounds are often of small caliber. They may be hidden under clothing, in hair, in body folds or openings, or behind closed eyelids."

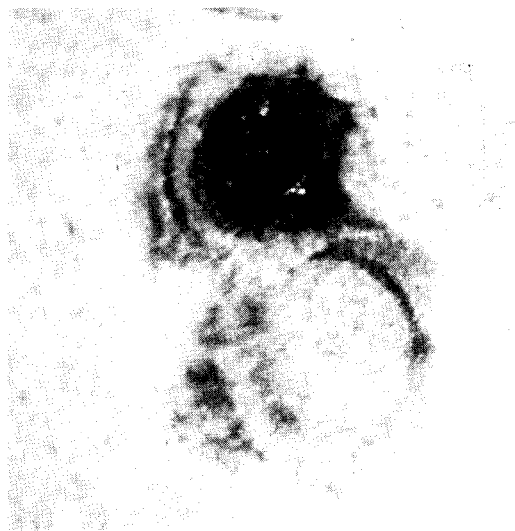


Identifying entrance wounds does not always tell the number of shots fired into the body. A single bullet can sometimes account for a number of entry wounds by piercing the body more than once. For example, a bullet may go through an arm before entering the torso. One of the aims of a pathologist's tracing of the path of the bullet is to try to match multiple wounds to the same bullet. A bullet striking a bony surface at an angle may split into two or more projectiles. The multiple projectiles can cause many exit and reentry holes. Ricocheting bullet pieces may also cause several wounds from a single bullet. On the other hand, more than one bullet may go through the same entrance wound. In one rare suicide case, a defective round failed to exit the barrel and a second round pushed the first in tandem through a single entrance.

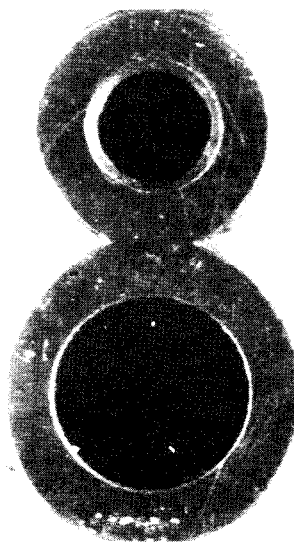
Bullets and other products of a weapon's discharge have characteristic effects on skin and clothing. These effects can indicate the distance from which the gun was fired. Contact and near contact wounds are made with the gun muzzle held against or less than an inch from the victim. Contact wounds, especially the ones on bony surfaces, are likely to be large, ragged stellate wounds. The explosive force of gases from the discharge often tears skin and tissues around the bullet hole, producing ragged everted lacerations radiating from the hole. But a contact wound

made when exploding gases are received and expended by a large body cavity, like the chest, may not be large or irregular. On the other hand, a contact wound to the head made by a high-powered rifle may show massive bursting fractures of the skull from the explosive effect of gas forced into the skull where it has no chance to expand. Contact wounds from small caliber guns like a .25- or .22-caliber pistol tend to be smaller and less devastating than such wounds from larger caliber weapons. This is because the discharge from small caliber weapons may not be forceful enough to disrupt the surrounding tissues.

Contact wounds leave an abrasion collar. The edges of the contact wound and the bullet track are burned. If the gun is fired through clothing, the surrounding fabric is also burned. The flame and smoke may cause a sooty, grimy halo around the wound. But when the gun's muzzle is held tightly against the skin, the bullet hole is not "tattooed" with powder grains embedded in the surrounding skin like it is in intermediate-range wounds. This is because most of the unburned powder and other explosive products are blown right into the bullet track. The contact wound may also show a bruise pattern from swelling gases blowing the skin back against the gun's muzzle. It may be shaped like the gun's muzzle end, sights, or extractor spring rod.



The bruise on this contact wound repeats the pattern of the over-and-under .22-caliber rifle that caused it. Note also the even-edges of the small caliber's entry wound.



Intermediate-range wounds are made when the muzzle is held between 1 and 48 inches from the victim. The wounds are often round, but their edges may show minor splitting. They differ from contact or longer-range wounds by having burns and powder tattooing in the skin around the bullet hole. Powder residues and other discharge products are projected onto the victim in ample amounts when a gun is fired within 2 feet of the target. Recognizing powder marks and residues can help you tell entrance wounds from exit wounds. Their pattern and composition help you deduce the range of fire and the kind of ammunition used. Precise range of fire tests can be made by laboratory test-firing the same weapon and ammunition. Types of powder residues can also be distinguished by chemical, photographic, radiographic, and spectrographic tests.

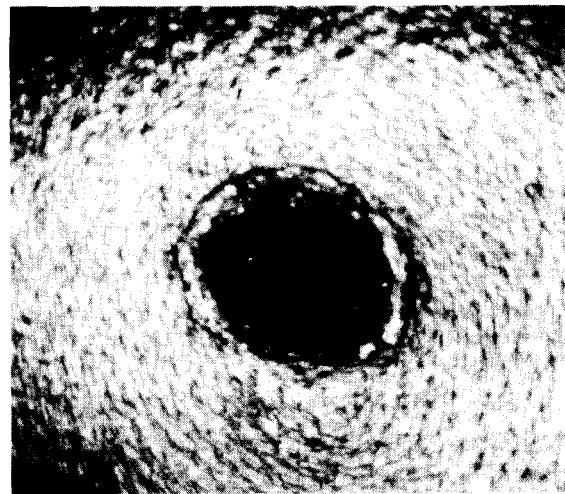
The burned and tattooed area is roughly circular. It becomes larger and more diffused as the distance between weapon and victim grows. The area has three zones. The flame zone is the zone of burned skin around and in the bullet hole. This is surrounded by the second zone where most tattooing powder grains and combustion products burn and stick to the skin. The last zone is under the skin, where sparsely scattered powder grains and residues are embedded in the dermis. Washing will not remove powder grains in the dermis.



If the burned, tattooed, and abraded areas form a concentric circular margin around the entry wound, the bullet probably struck the body at right angles. Bullets striking at a shallower angle show marginal bruising and abrasions at the point where the bullet first meets the surface. Bullets striking at extreme angles may cause shallow furrowed wounds. These grazed, or tangential, wounds may be followed by an entrance wound. Or they may be followed by closely spaced entrance and exit wounds. It depends on the conformation of body surface in the path of the bullet.

If a gun is fired at close range and at an angle to the body, powder marks will seem to spread away from the bullet hole in an uneven V-shape. The point of the V will point toward the weapon. The size of the ammunition and the type of powder also affect the nature and extent of powder residues. At a distance of 3 to 4 feet, powder marks may not be present on a victim shot with a handgun.

Long-range wounds are made by muzzles held more than 48 inches from the victim. The wounds are generally rounded holes with circular abrasion collars. There are no burns or powder tattooing. Small caliber contact wounds and other contact wounds over soft-tissue areas may look like long-range wounds. But they can be distinguished by the powder residues deep in the tissues in the bullet track.

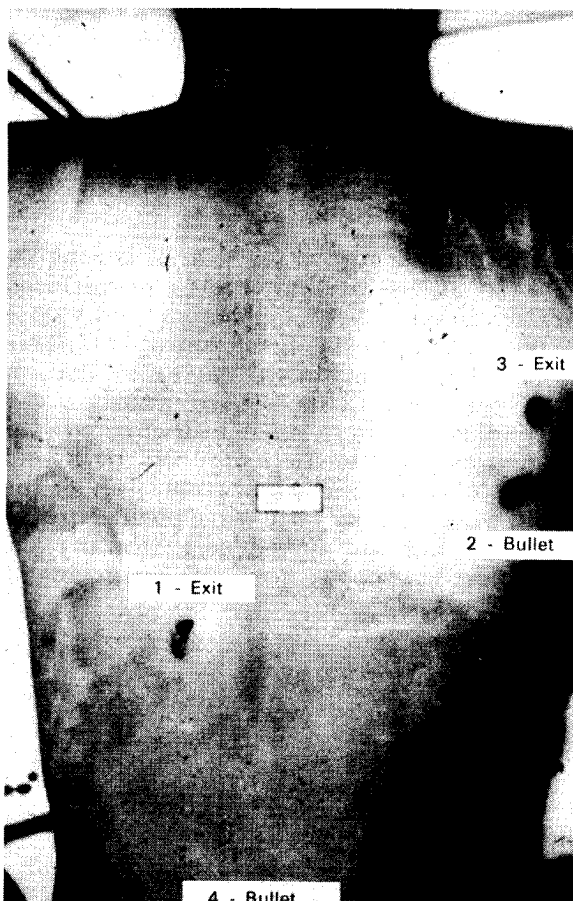
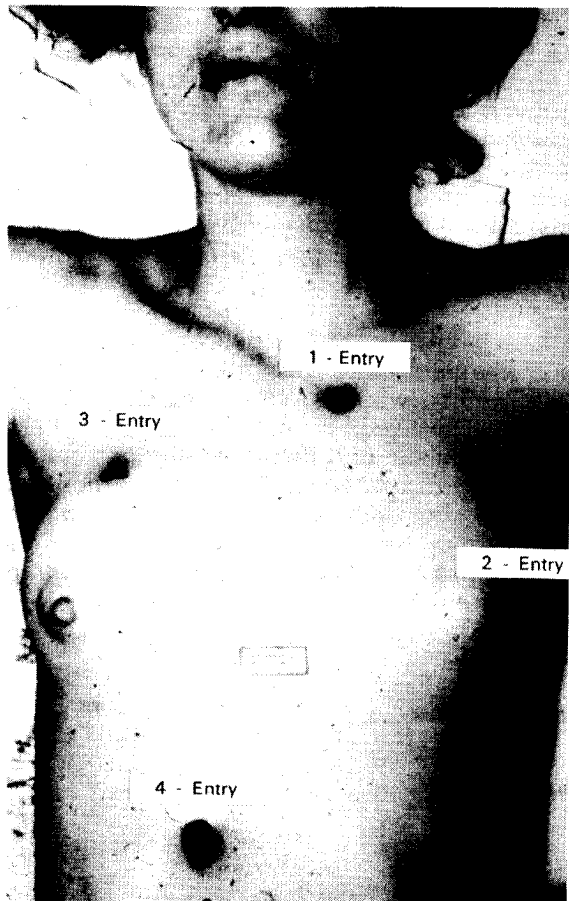


The characteristic burns and powder tattooing in the skin around an intermediate-range wound contrast markedly with the rounded hole, and circular abrasion collar of the long-range wound. Long range wounds and some contact wounds sometimes look similar, but long range wounds have no evidence of powder burn, inside or out.

Exit Wounds

Exit wounds often show more damage than entrance wounds. Exit wounds are ragged and rough in shape. And they are often larger than the bullet itself. Tissues, compressed in front of the bullet, burst when the bullet breaks through and exits the body. Also, the bullet is often fragmented, deformed, and tumbled by impact. It is therefore more destructive. Thus, exit wounds may bleed more than entrance wounds. And pieces of internal tissue may protrude from the wound.

Because a bullet loses momentum as it passes through the body and its tough, elastic skin, it sometimes uses up its remaining energy at the point of exit. Thus a bullet may be found protruding from the skin or loose in a victim's clothing. It may also be found under the skin, where it has caused swelling or bruising. If a bullet is lodged in a body, advise the surgeon of its potential value as evidence. Request he not probe for the bullet except as a last resort. If probing is needed, request that rubber tipped forceps be used to remove bullet.



The unexpected locales of the exit wounds are the result of the bullets changing paths from contact with internal organs and bones. The uneven livor mortis is the result of pressure, from a strap on the left shoulder and from the shoulder blades, that kept the blood from settling evenly.

SHOTGUN PELLET WOUNDS

Shotgun wounds are very different from wounds caused by other firearms. The destructive force of a shotgun blast at close range is great. If the wound is to the head, the shape of the head may be greatly changed.

Large sections of the head or face may be blown away. Close-range wounds of the trunk and abdomen may cause loops of intestine or other organs to hang out of the body. Or it may blow away a large portion of a victim's body.

When a shotgun is fired from a distance of 10 feet or less, the charge strikes as a fairly compact mass. It leaves a large central, circular hole with very ragged edges from the many single and overlapping punctures made by the shotgun pellets. This is known as the cookie cutter effect. Scattered around the large central hole are smaller holes made by individual shot beginning to disperse in flight. When a shotgun is fired at close range, the wounds are grossly burned and tattooed. As the distance increases between weapon and victim, the wound shows less tattooing and no burning. Beyond 10 feet the shot spreads in flight and strikes the body in a more scattered grouping so that no central hole occurs.

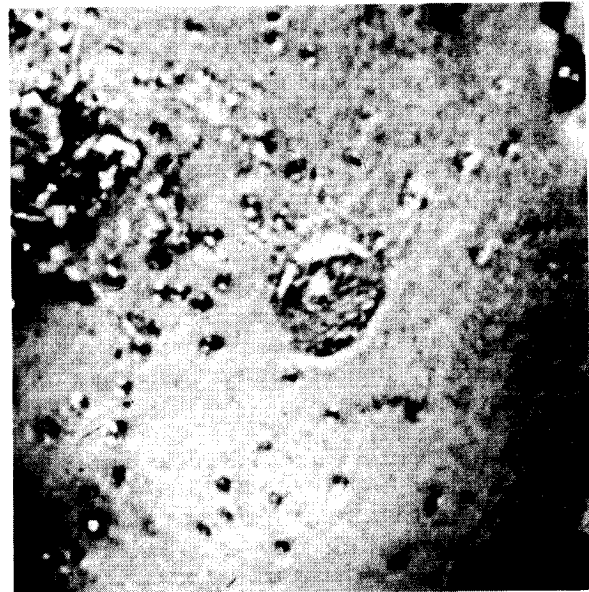
The length of the shotgun's barrel and the type of ammunition also influence the spray of the shot and the scattered pattern of the wound. A sawed-off barrel allows quicker spreading. And the spray may be cut if the shotgun is choke-bored. The slightly narrowed muzzle focuses the shot and delays its spraying. Birdshot, even when fired at close range, usually does not go through the trunk or abdomen of an adult. But when the shot load goes through a thinner portion of the body like the neck, limb, or shoulder, it makes large lacerated exit wounds. Sometimes small, ragged exit wounds are

made when only some of the birdshot exits the body. At close range, buckshot, having a greater weight and energy, causes wounds similar to those made by large bullets.

Shotgun pellets cannot be linked to a certain gun by ballistics markings as rifled bullets can. However, the size of shot may be learned from printed material on the top wad or by marks left in the wadding. It can also be learned from printed information in the shot column. The gun's gauge may be learned by comparing the diameter of the wad with other wads. If the wadding has not struck an intervening zone, it can be found within 50 feet of where the gun was fired. If the gun is fired within 10 feet of the victim, the wadding is often carried into the body with the shot.

SHOOTINGS

For self-inflicted gunshot wounds, unless some special contraption is arranged, the victim generally must hold the gun close to his or her body. Rifles and shotguns are sometimes fired by using a stick or string hooked to the trigger guard or by pushing the trigger with a toe or a device. Riggings made to pull the trigger, or removal of a shoe, strongly suggest suicide. And because a suicide's hands may be close to the wound when it is caused, they may be bloodied by the entrance wound.



At less than 10 feet, pellets leave a central circular hole with ragged edges and many overlapping punctures. Fired at a distance, the pellets have a spreading flight pattern and leave no central hole.

Suicide wounds are usually single, close-range or contact wounds on a part of the body that is easily reached. But sometimes suicides shoot themselves more than once before being disabled or dying. The presence of misfired rounds in or ejected from a weapon may also hint at suicide. Suicides sometimes fire shots to check the weapon while working up nerve to complete the act. Or they may misfire the weapon from momentary loss of nerve.

Often suicides expose the part of the body being attacked. For example, they tend to open their shirts before placing the muzzles against their chests. The chest and abdomen are often the target when a rifle or shotgun is used. The temple, the mouth, and the chest over the heart are common sites for suicidal attacks with a handgun. But most handgun suicides attack the head just in front of and over the ear.

Suicide victims may guide the gun by holding the barrel with the nonfiring hand. In which case, that hand will have burns from the flame from the muzzle and breach. The hand may also show singed hairs and leave powder residues. But finding primer residue on a victim's hands is not in itself conclusive proof of suicide. It must be considered in light of other facts in the case. Residue can be present on a victim's hands because they were close to the muzzle blast of a shot fired by someone else.

Condition of the weapon can suggest the manner of death. The gun may be defective. Perhaps the gun's safety catch is defective. Or the gun may not have a safety catch. Perhaps the gun can be discharged by dropping it. Evidence may show that the trigger caught on something, discharging it accidentally. Finding a serviceable weapon, needing normal force to pull the trigger, with good safety devices, may help rule out accidental shooting.

Most accidental shootings occur because of a victim's careless handling of or unfamiliarity with a gun. Perhaps the victim was on a hunting trip or was cleaning, loading, or otherwise working on the weapon. Evidence may show that the victim was handling the weapon unsafely, showing how

another person killed himself, or playing "quick-draw." Children and young people often become accident victims by playing with guns.

Accidental deaths are often witnessed and reported. If the wounds are not self-inflicted, the report is often made by the person who fired the gun. Unwitnessed accidental gunshot deaths may look a lot like suicide. But, in most cases, the known attitude and life-style of the victim, plus the lack of a clear case for suicide or homicide are strong signs of an accident.

Most deaths due to multiple gunshot wounds have proven to be homicides. The murderer, usually related to or closely acquainted with the victim, fires in a fit of rage, panic, or other strong emotion.

The location and number of empty shell cases at the scene may tell you the number of shots fired and the relative positions of the gun and victim. Lining up the final resting point of the bullet, position of the victim, and entry and exit holes on the victim can help tell the position from which a gun was fired. And a gun may have been fired close to or while resting on some surface. If so, it will have left powder residue. This also may tell you the position from which the gun was fired. All feasible surfaces of weapons, shells, magazines, must be checked for fingerprints.

When you recover bullets at a crime scene, *record exact details*. Give the location and condition of the bullet, the type of material it pierced, and its depth of penetration. Note irregularities of size and shape and the approximate angle of impact. Note any other information which may help the lab examiner. And be sure to note in your crime scene sketch the point at which each discharged bullet or fired cartridge case was found.

Markings may be placed on a bullet by the weapon's bore. Other marks may be placed on the cartridge case by the firing pin, breach block, chamber extractor, and ejector. Also, a lead bullet impacting on cloth may receive a patterned impression of the fabric's weave. This may be useful to prove that a particular bullet passed through the victim.

At the laboratory, powder residues on evidence are tested chemically and microscopically. Bloodstains, hairs, fibers and similar trace evidence are identified and

compared. The lab may be able to tell from the residue or burns on the clothing the approximate range from which the bullet was fired.

DEATHS INVOLVING ASPHYXIATION

When the body or any vital part of it is deprived of oxygen, asphyxia occurs. Death from asphyxia alone is most often due to natural or accidental causes. Many diseases and infections can hinder airways. And foreign bodies like meat or bone can become trapped in the throat or windpipe, causing asphyxia. Food particles are often the cause of accidental choking deaths in adults. Choking deaths of children are common from food and from small plastic or metal toys. And pressure on the outside of the chest that restricts breathing can cause asphyxia. This pressure can occur in cave-ins, building collapses, or traffic accidents.

Inhaling chemicals like ammonia, chloroform, carbon monoxide, and carbon dioxide also may cause asphyxia. Sometimes these chemicals are the cause of suicidal or homicidal deaths. Homicide and suicide by asphyxia alone are rare. But in learning the reasons for death by asphyxia, anything suspicious must be pursued through background investigation and autopsy. Only then can the death be ruled accidental or natural.

STRANGLINGS

Strangulation is asphyxiation from compression on the neck. It can be done manually or with a ligature like a binder, a rope, a necktie. Strangulation may also be caused by hard blows to the neck. Judo or karate chops to the throat may cause damage to the larynx, followed by suffocation.

Manual strangulation is a homicide. A person cannot strangle himself with his hands, because when he loses consciousness his hands relax and his breathing resumes. In manual strangulation, the attacker's fingernails often make small tell-tale bruises or marks on the neck. But the marks on the neck will not show the direction from which the victim was attacked. Fingernails vary too much in size and shape. Another sign of

manual strangulation is hemorrhaging in the throat area. This can be seen in an autopsy. Sometimes a fracture of the hyoid bone, a U-shaped bone at the base of the tongue, is also found.

Strangulation by ligature may be homicidal or suicidal. It is a fairly common form of suicide, but it is a rare form of homicide. The ligature often is made from something handy at the scene. Pajamas, neckties, belts, electrical cords, ladies' stockings, and other items can be used. Strangulation by a garrote of rope or wire sometimes is used in homicidal strangulation, but it is not seen very often. Close inspection of the marks left on the skin may show the type of garrote used. If possible, *leave the ligature in place* for a pathologist to remove during the examination.

When you investigate a strangulation, search the scene and the victim for signs of struggle. Obtain fingernail scrapings. Check the body for signs of defense wounds that may suggest homicide. But look for the presence of hesitation marks hinting at attempted suicide by other means before ruling it a homicide.

HANGINGS

Hanging is asphyxiation by strangulation using a line of rope, cord, or similar material to work against the hanging weight of the body. Hanging is most often suicidal. But sometimes it is accidental. It is seldom homicidal, except in lynchings.

A person does not have to be fully suspended to hang. Hanging may occur if a victim jumps or is pushed from a height while tied by a line to a rafter or a tree limb. If the height is more than just a few feet, the victim's neck may break. But the neck is seldom broken in suicidal or accidental hangings.

At the scene you must check the beam or rafter over which the line is laid for marks showing the direction of travel of the line. You may want to remove the line for inspection. The hanging line must be checked in a laboratory to learn if it pulled against the weight of the body. Inspect the scene for signs of a fight and signs of defensive marks or rope burns. But keep in mind that an unconscious victim may convulse, knocking over items in the immediate area.

When you take down the body, *do not untie the knots*. The type of knot may give you a lead to follow. Remove the hanging line from the victim's neck by cutting the line on the side opposite to the knot. Make a careful inspection of the groove around the neck. A close look at the edges of the groove will often show black and blue marks from minute bleeding. Ruptured blood vessels in the skin mean the victim was alive at the time of the hanging. But the lack of these marks does not necessarily mean the victim was dead at the time of hanging. Combined with other conditions, however, it could raise suspicions.

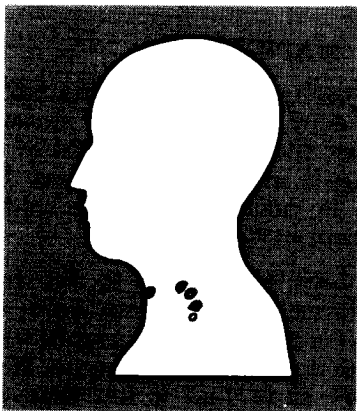
Note the position of the groove as it relates to the location of the knot. The mark of the ligature should agree with the location of the knot. For example, if the knot is in front of the face, the deepest part of the groove should be

on the nape of the neck. Anything different suggests homicide.

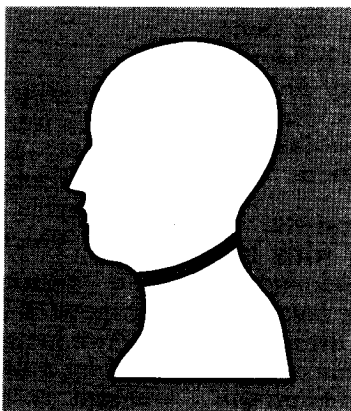
When a fixed knot is used in hanging, the groove will form an inverted V on the side of the knot. The bruise on the skin in the groove is greatest opposite the knot. It tapers off as it reaches the knot. If a slip knot is used, the groove may be uniform around the neck.

If the victim is nude, suspended before a mirror, or suspended in an unusual manner, or if any of these conditions are combined, you may suspect an accidental hanging from sexual activity. Accidental deaths may occur from autoerotic sexual acts using restraints like ropes, cords, chains, and handcuffs. The victim, trying to reach sexual contentment, uses these items to restrain his or her hands, arms, legs, and neck. When strain on the neck causes unconsciousness or when the victim loses balance during the act, accidents occur. The victims are unable to release themselves because of the binding on their hands, arms, and legs. They may end by hanging themselves. Sometimes, when they use binding material or plastic bags on their faces, they suffocate. A notable feature of this type of death is the presence of female attire and articles on or near a male body. And erotic material is often present. In the past, these deaths were often incorrectly labeled suicides. But they are accidental and they must be listed as such.

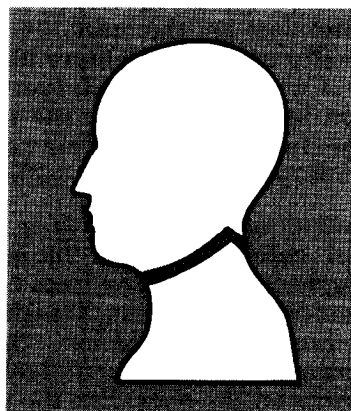
VISIBLE PATTERNS CHARACTERISTIC OF STRANGLINGS AND HANGINGS



The finger bruises of a manual strangulation.



The even pressure and straight furrows left by a ligature.



The inverted V and the angular furrows of a hanging.

Other accidental hangings differ from autoerotic deaths in the lack of female attire, erotic material, or constrained hands or feet. And accidental hangings often involve infants and young children. Infants can get caught in restraining devices. They can get their clothing caught on things. Or they can get their heads caught between crib or fence slots. If they are unable to get themselves free, they may strangle. For no known reason, young children, especially boys, will put nooses around their necks. They too may strangle to death.

DROWNINGS

Drowning is asphyxiation from water or liquid being inhaled into the airways, blocking the passage of air to the lungs. Water inhaled into the windpipe causes violent choking. The choking irritates the mucous membranes of the airways causing a large amount of sticky mucus to form. The mucus, mixed with the water and agitated by violent attempts to breathe, turns into a thick sticky foam which fills the windpipe.

Most drownings occur when the victim submerges in a body of water. A small number of "drowning" deaths among swimmers are actually caused by their hearts stopping from the shock of submersion. Most commonly, a drowning victim has a violent spasm of the neck, throat, and chest muscles. This prevents breathing. The victim submerges, inhaling water. The victim may stay submerged the first time he goes under. Or he may go under and surface many times, until he can no longer struggle to the surface. Loss of consciousness often occurs fast. Because the human body is heavier than water, when unconsciousness occurs, the victim sinks and tends to lay at the bottom with the head down. Breathing may continue briefly with varying amounts of water inhaled. The heart may beat briefly after breathing stops. Death by asphyxia occurs within a few minutes. Barring strong currents, a body sinks fast. It often comes to rest at a point close to where it was last seen on the surface.

Rigor mortis may start early because of violent muscular struggle. Postmortem lividity occurs, but is often a light red in color

and is most noted in the head and upper body. This is because of the body's tendency to sink head down. The foam that formed in the airway may exude from the mouth and nose. Often, the victim's hands will be grasping gravel, mud, or grass. The hands and fingertips may be scratched from violent grasping efforts. The palms may be cut by the fingernails during the hands' violent clenching motions. And medical laboratory study of the victim's bone marrow may show microscopic bodies. These factors are good circumstantial signs that the victim was alive when he entered the water.

After a few hours, depending on temperature and movement of the water, postmortem changes peculiar to submersion begin to occur. The skin, especially on the hands and feet, becomes bleached and waterlogged. Palms develop a very wrinkled condition called washer-woman hands. The constant churning of water currents or long periods of submersion may cause maceration. This is the wearing away of skin and flesh, especially of the hands and feet. Mutilation may occur from propellers of boats. This causes the appearance of postmortem dismemberment. Parts of the body, notably the face, may be eaten by marine life. As bacteria mounts in the body, putrefaction begins. As putrefaction progresses, gases build up in the tissues, organs and body cavities. The body becomes distended with gas. This makes the white foam in the airway come out of the nose and mouth. As the gases build up, the body becomes buoyant. Warm water speeds putrefaction; cold water slows it. In warm water, buoyancy may occur in a couple of days. In winter, the action may be slowed for weeks or until spring. As putrefaction advances, the skin loosens from the tissues. Sections of skin, especially hands, feet, and scalp, may fall from the body.

Unless a body is heavily weighted down or firmly caught on underwater debris, buoyancy will eventually cause it to rise to the top and float. If a body is prevented from rising, the gases eventually escape. Then buoyancy leaves and a body may stay down forever. When a "floater" rises and is exposed to the air, decomposition proceeds at a much faster rate.

Prolonged submersion and decaying may dim or destroy the external signs of asphyxia. Signs of violence or other cause of death may also be lost. Prolonged submergence makes death by drowning medically difficult to diagnose. But medical evidence may show signs of asphyxia like foam in the airways, and an enlarged heart. It may also show changes in the blood from water absorbed during drowning. Algae and other substances from the water may be found in the stomach or airways. Chemical tests during an autopsy can show if the person was alive when he entered the water. But chemical tests are nonspecific, and none are diagnostic of drowning.

Suicidal drownings in places like bathtubs are hard to distinguish from accidents unless a reason is suggested or some other means of suicide was also attempted. Check for marks which may show suicidal intent. A weighted body strongly suggests homicide. But suicides may weight their bodies to speed drowning and stop recovery. Inspect weighted bodies carefully for injuries suggesting homicide. See if the binding and weighting method could have been done by the victim. Check for self-inflicted injuries such as cut wrists or any other sign of suicide.

Homicidal drownings are rare. Unless accompanied by signs of homicidal violence or other such conditions, the autopsy shows only signs of asphyxia by drowning. There have been times when submerged bodies have shown no signs of violence, but, after the body dried out, bruise marks and small

abrasions appeared that could not be seen when wet.

ELECTRICAL SHOCKS

Death by asphyxiation can occur as a result of electrical shock. The shock stops the action of the heart, and the brain, deprived of oxygen, ceases its function. The effect of electrical shock on a person depends on many things. It depends on their health. It also depends on their location and how wet or dry it is. And it depends on the amount of voltage they receive, how long they are in contact with this voltage, and the after-effects of the shock.

Electrical shocks often leave marks, although it is possible for a body not to show outer or inner damage. Usually electrical shocks leave entrance and exit wounds on the body. These have a grey or white puckered look. Severe burns from higher voltage, called Joule burns, are often brown and take the form of the thing that caused the fatal contact. Lightning deaths leave a characteristic mark that resembles a fern leaf. High-voltage shocks may leave marks where metal objects have melted on the person. And there may be extensive fractures of the bones.

When you investigate a death by electrical shock, you need to check weather conditions, electrical appliances the victim may have been using, and the victim's location and activity at the time of death to determine if the death is accidental or not. Deaths from electrical shock are most often accidental. Murder by electrocution is rare. But it is possible.

DEATHS INVOLVING SHARP-EDGED INSTRUMENTS

The body's vital functions can be fatally impaired by injuries from sharp-edged instruments. Deaths or injuries from stabbing, cutting, and chopping are hard to evaluate without extensive experience. But the type of wound and the victim's personal history can help decide if death was an accident, a suicide, or a homicide.

STABBINGS

Stab wounds may be made by any object with a fairly sharp point. Knives, scissors, ice

picks, triangular files, or hat pins can all make stab wounds. Sometimes stab wounds look like other kinds of wounds. A wound made with a stiletto or ice pick may look like a bullet wound. And the reverse may be true. If examination fails to show a sure sign of stabbing, the wound may have been made in some other way. X-rays may help to locate an unsuspected bullet or piece of a weapon, such as a knife or stiletto, which may be inside the body. Most stab wounds involve some cutting. This occurs as the weapon is pushed in or drawn out.

The shape of the wound depends on the direction from which the weapon penetrates. It also depends on the shape of the weapon. And it depends on the movement of the weapon while in the wound. For instance, a flat blade piercing a body at a right angle to the surface of the skin often causes an oval-shaped wound with pointed ends. If the blade's penetration is parallel to the cleavage lines, the wound is more or less closed. However, if the wound is at right angles to the direction of the cleavage lines, the sides pull because the fibers are elastic. A gaping wound is made. If the blade pierces a body at less than a right angle, it makes a beveled wound. If the blade moves around in the wound, an uneven-shaped scrimmage wound is made. Often the weapon is turned slightly as it is withdrawn. This causes a wound that has a notch in one side.

The depth and shape of a fatal stab wound, fixed during an autopsy, may give a clue to the type of weapon used. The track of a weapon may be very clear in fleshy areas. However, when a weapon penetrates inner organs, its track may not be accurate. Inner organs change in shape and position after death and when a body is moved. Also, a strong stabbing force against a soft area like the stomach can depress the area, making the wound deeper than the true length of the weapon. Likewise, a longer blade may not penetrate its full length. Then the wound path is shorter than the blade.

A homicidal stab wound often penetrates a victim's clothing. For this reason you must take special care when removing and checking the victim's clothing. Many times the clothing matches the real width of the weapon better than the wound does.

Pierced bony surfaces like the skull, sternum, or spine often show the shape of the part of the weapon that passed through the bone. And sometimes weapons break off or are left in the bone. The blade or portions of it may project from the inner part of the bone. If a blade is broken in a fatal stab wound, the part of the bone with the blade in it may be removed at the autopsy. It can be used as evidence of the corpus delicti, especially if the matching part of the weapon has been preserved as evidence.

To tell if a wound was made before or after death is difficult. A good inspection of the wound made before the body is moved is very important. If the wound was made before death there should be evidence of blood clot, swelling, wound healing, or infection.

Accidental stab wound deaths are rare. When they do occur, they are often caused by the victim's falling through glass doors or windows. The victim is stabbed by the larger pieces of broken glass. Other stabbing accidents may occur when victims fall on sharp pointed surfaces of tools or equipment. Sometimes victims are pierced by large splinters, by vehicle surfaces, or by horns or tusks of animals.

Most fatal stab wounds are homicidal. Often there is only one wound which pierces a vital organ or nerve center causing death from shock, hemorrhage, or the ceasing of a vital function. Homicidal stab wounds often appear on the back, neck, and upper chest. When many wounds are present on different parts of the body, homicide is strongly indicated. Wounds of the same depth, wounds of nonvital areas, scrimmage wounds, and multiple wounds of a vital area strongly support homicide. Several stab wounds to the breasts and genitals are suggestive of a sex-related homicide. And defense-type wounds on hands and arms and wounds to the back or other areas not easily reached by the victim hint of homicide.

Many stabbings are not instantly fatal. The victim may live for days and then die from acute infection or other medical problems. Stabbings usually are not immediately disabling. Unless the victim is unconscious or otherwise helpless, the scene is likely to show signs of struggle. Signs of flight and traces of blood are likely to be scattered over a large area.

Suicides most frequently stab themselves in the chest over the heart. But suicidal stab wounds may be made on any area of the body that can easily be reached. Like suicidal shootings, the victim will often open up clothing or uncover the selected stab area. Often the knife is left sticking in the wound.

In some cases, the suicide may jab the weapon into his chest a number of times. In such cases, the wounds often vary in depth.

Many of them may barely penetrate the chest. These hesitation wounds are made as the victim works up nerve to force the weapon through. Suicides sometimes stab themselves repeatedly in different directions, through the same wound, without completely withdrawing the weapon. This causes more stab tracks than outer wounds. Hesitation cuts under the wrist or thighs are good signs of the suicidal intent of a victim.

CUTTINGS

A cut is an incised wound made by a sharp-edged object. The sharp edge is pressed to and drawn over the surface of the body to inflict a cut. Knives and razors account for almost all incised wounds. Cutting wounds can cause fatal hemorrhages and infection. They also can be fatal if the victim inhales blood from a cut airway. Cuts often are made on exposed surfaces like the head, neck, and arms. Where many cuts are involved, those on the palms of the hands and the outer surfaces of the forearms of the victim are often defensive

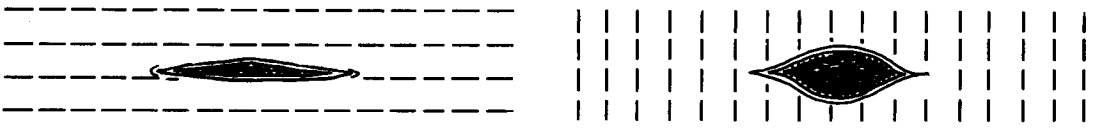
cuts. They may indicate a homicidal attack. Heavy maiming and dismemberment may accompany sex murders.

Homicidal cuttings are usually deep, clean cuts without hesitation marks. The wounds may be on various parts of the body. But most often they involve the head and neck. Homicidal slashing wounds may be present. Such a wound may be a single deep cut on the side of the face and neck. Or it may be one of many deep slashes crisscrossing each other.

Sometimes when a victim tries to dodge slashes there are small shallow cuts near larger wounds. These defensive wounds may be confused with suicidal hesitation cuts.

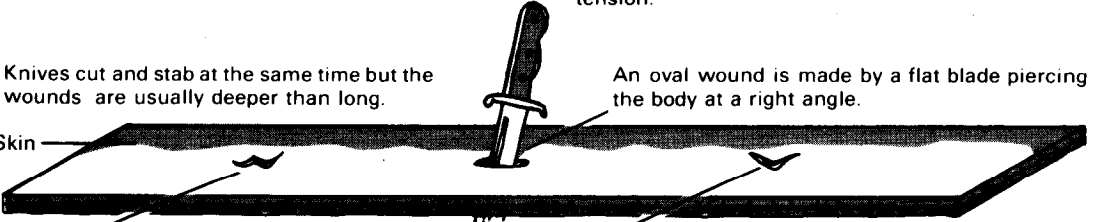
Suicidal cuts are often many, parallel, overlapping incisions of varying length and depth. Many times they have a lot of smaller shallow hesitation cuts on the lead edge of the injured area. Fatal suicidal cutting wounds are often on the throat. A right-handed suicide normally holds the weapon against the left

WOUNDS INVOLVING SHARP-EDGED INSTRUMENTS



Closed wounds lie parallel to the lines of skin tension.

Gaping wounds lie at right angles to the lines of skin tension.



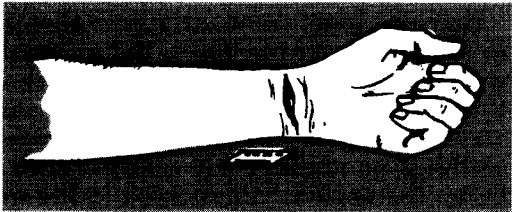
Knives cut and stab at the same time but the wounds are usually deeper than long.

An oval wound is made by a flat blade piercing the body at a right angle.

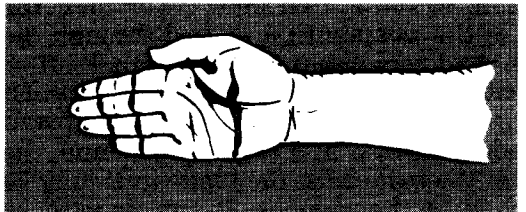
Skin

A beveled wound is made by a blade piercing the body at less than a right angle.

A scrimmage wound is made by a knife being twisted in the body.



Hesitation cuts are the minor marks surrounding the final deep wound frequently observed in suicides.



Defensive wounds are made by the victim's attempts to protect himself by grabbing the weapon.

side of the neck and draws the weapon to the right and across the throat. A left-handed suicide usually does the opposite. But sometimes a suicide holds the weapon against the neck on the same side as the cutting hand and pulls forward and downward across the throat. When a throat is cut, fatal bleeding sometimes results from a fairly shallow cut which severs a large vessel. Sometimes the cut starts shallow and gets deeper, cutting deep neck structure. The cut may reach the voicebox, deep vessels, windpipe, and esophagus. It may even scratch the spine. Often, a suicide slashes the wrist opposite to the cutting hand before attacking the throat.

Other self-induced cuts may be made to the groin, thighs, ankles, knees and the inside of the forearm at the elbow. Suicidal cuts on the limbs are often not fatal. Frequently found on persons who have killed themselves some other way, they support a judgment of death by suicide.

Accidental incised wounds are rarely fatal. They occur most often from broken glass or contact with moving machinery or sharp tools. Most times the situation clearly shows the accidental nature of the injury.

DEATHS INVOLVING BLUNT FORCE

Blunt force damages the body by direct physical violence. Generalized blunt force affects the whole body or a large part of it. Deaths caused by such force may happen in vehicle accidents, explosions, or falls from a height. Localized blunt force impacts on a limited area. Death involving localized blunt force can be caused by contact with a fist, weapon, or foot.

Blunt force injuries of the skin and tissues under the skin are of three general types - abrasion, bruises, and lacerations. Abrasions are surface injuries to the outer layer of skin at the point of impact. An abrasion may duplicate the surface appearance of the impacting object. It may look like the grill pattern of an automobile or the rough edges of a file. It may look like a threader pipe or the treads of an automobile tire. Bite and nail marks are considered abrasions. But they actually may be small

CHOPPINGS

A chopping wound is a mangling, tearing cut. The wound is usually made with a heavy instrument like a cleaver, a machete, a hatchet, or an ax. Death from chopping wounds may come from shock, hemorrhage, or interruption of vital functions.

Most chop wounds are homicidal. They are usually made on the head, neck, shoulders and arms. Injuries may be multiple. Injuries received by the victim in an attempt to defend himself may include total or partial loss of fingers, hands, or arms. Fatal accidental chop wounds sometimes occur from propeller blades of fans, boats, or planes. Suicidal chop wounds are rare.

Because the shape and size of chopping wounds often resemble the shape and size of the weapon that made them, autopsies may provide medical evidence. A pathologist may be able to determine the type of weapon that was used by examining the depth, width, and appearance of the wound and the amount of tissue damage. He may be able to link the injuries to a suspected weapon. It may even be possible to take tool mark impressions of the weapon from bone or cartilage.

puncture wounds. Abrasions normally are caused by direct violence from hands, blows of a weapon, or collision with a vehicle. They may also be caused as a body falls and strikes a surface.

The appearance of an abrasion, and its linear scratches on the skin, may show the direction of the injuring force. Often the end portion of the abrasion will show many small bits of loose, ragged skin. Abrasions on a live person seep blood and plasma. They develop reddish black scabs. Postmortem abrasions show little or no seepage, because blood circulation has ceased. Such abrasions look like translucent, yellow parchment as they dry. Sometimes patches of skin falling from a decaying body expose raw surfaces. These may dry like a reddish brown antemortem abrasion. But a pathologist may be able to confirm the lack of vital reactions, if decay is not too advanced.

Abrasions received at the time of death cannot be readily told from those received after death. But abrasions occurring well before death have a different appearance and color from postmortem abrasions. A pathologist can usually distinguish between them.

Bruises, or contusions, occur when blood escapes within tissues from small blood vessels ruptured by blunt force. A bruise is a red-blue area which is often raised or swollen. Unlike an abrasion, a bruise does not always lie at the point of impact. The blood may travel some distance in deeper tissues. And blows to the body may bruise body linings and inner organs without producing external bruises. Although patterned bruises are less common than patterned abrasions, they may occur and show the nature of the object that struck the body.

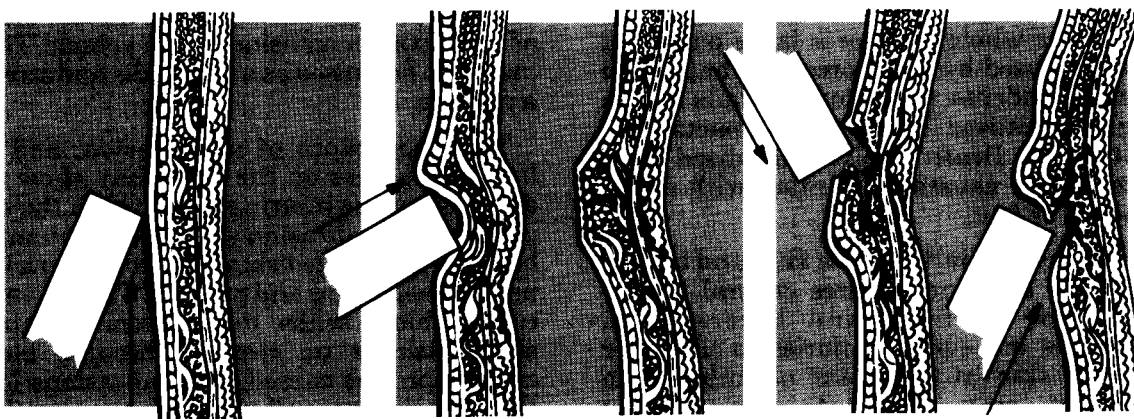
Distinguishing a bruise received at the time of death from one which occurred a few minutes before death is often not possible. But bruises made after death have a different appearance. They must be made by gross force to cause even minor bruising. They are not swollen, because circulation has ceased. Instead, they are often depressed at the center of impact. They are yellowish in color and translucent in appearance.

After decay starts, it may be hard to tell bruising from postmortem lividity marks. In early lividity, pressure applied to a mark blanches a lividity mark, but not a bruise. In later stages, a pathologist distinguishes bruising from lividity by microscopic inspection. Blood appears in the tissue in bruises, but only distends the vessels in lividity. However, as decay advances, gaseous pressure rises and postmortem rupture of many small vessels may occur. Then it becomes impossible to tell antemortem bruising from postmortem decay.

No precise estimate of the age of a bruise is practical. The color changes that occur as bruises age vary with the depth and size of the bruise. In general, a surface bruise is red-blue when recent. Within a week or two it looks greenish. Later it turns yellow. By the end of a month it has vanished.

The size of a bruise may indicate the degree of violence causing it. But not always. Females tend to bruise more readily than males. Bruises occur more easily on the very young, old, fat, soft-skinned, poorly-conditioned, and sick. And a light blow to soft tissues like the eyelid or genitalia may cause gross bruising, while a heavy blow to dense, fixed tissue like the scalp may cause only mild bruising.

BLUNT FORCE INJURIES TO THE SKIN AND TISSUES



Abrasions are surface injuries to the outer layer of skin, grazing linear scratches in the direction of the force.

Bruises, or contusions, are ruptured small blood vessels under the skin, causing raised red-blue area at the point of impact.

Lacerations are ragged-edged depressions in the skin from tearing or splitting of tissue in the direction of the blunt force.

Lacerations are caused by a shearing force or violent depression to the skin, which tears or splits tissues. Lacerations may be caused by blows from fists, sticks, or hammers. They also may occur from the impact of a motor vehicle or as a result of a fall. Lacerations, characteristically, are bruised and ragged-edged. The tissues are unevenly divided and the blood vessels and nerves are crushed and torn. The crushed ends of vessels may show only slight bleeding. Lacerations may contain foreign material like soil or glass from the impacting object. Lacerations of the scalp, face, eyebrow, or skin near bone have a linear splitting effect. These may be hard to tell from cuts.

Normally it is not possible to tell lacerations made at the time of death from those made shortly after death. The distinction depends on the presence or absence of vital reactions like bleeding and bruising in the wound. Lacerations made during life tend to gape. But lacerations in heavy muscles like the thigh, especially those that cross the grain of the elastic tissue fibers, tend to gape at any time.

Homicidal deaths may occur from either generalized or localized blunt force. Victims may be struck with fists or blunt objects. Or they may be thrown from heights, pushed in front of moving vehicles, or crushed with heavy objects. Sometimes homicidal blunt force deaths involve fatal injuries from negligence. This may occur in highway accidents.

Suicidal deaths from blunt force usually involve generalized blunt force. The victim jumps from a high place or in front of a moving vehicle. But sometimes a suicide may ram his head into a wall or in some other way create enough impact or crushing force to cause fatal injuries. Accidental deaths from blunt force are usually falls.

Often your investigations of death involving generalized blunt force will show that the injuries have resulted from impact with a vehicle. And you must be able to link the vehicle to the victim by trace evidence left at the scene or found on the persons or vehicles involved.

If circumstances suggest a hit-and-run accident or a vehicular homicide you must

initiate an immediate search and apprehension plan. Such a plan may include setting up coordinated MP patrol activities and roadblocks. It may include searching and patrolling parking lots, service stations, residential parking areas, motels, taverns, bar rooms, garages, and body repair shops. If a military vehicle could be involved, it must include alerting and checking motor pools. And it includes checking known license and registration data at once.

At the scene, look for evidence supporting the crime and linking the vehicle and victim. Check skid marks to learn about the vehicle's speed, the alertness of the driver, and to check the accuracy of the driver's and witnesses' statements. Take samples of dirt from under the vehicle to link it to the point of impact and to use for future comparison. Photograph and cast tire tracks before they are disturbed. Take the bumper height measurements to match them to the victim's injuries. This may help you learn if the vehicle at the time of impact was braking, maintaining, or increasing its speed.

Collect material from the scene and from the victim or the victim's vehicle that may have come from the offender's vehicle. Broken glass, vehicle trimmings, paint chips, and liquids may identify vehicle-type and may be compared with a suspect's vehicle. Pieces of glass and paint too small for matching fractured surfaces can undergo spectrographic tests and other lab tests to learn specific gravity, refractive index, optical dispersion, and other physical properties to match it to the vehicles involved and to the manufacturer.

Be sure trace evidence from the victim like blood, body tissue, hairs, and textile fragments are also seized. And vehicles suspected of having been involved must be checked for signs of impact and traces of the victim or victim's clothing. Often, in hit-and-run accidents, the victim's clothing leaves patterned rub marks. The pattern may show in the chassis paint. It may also show on grease and mud on the undercarriage. Likewise, hand, finger, and even lip prints of the victim may be left on the vehicle. And hair, tissue, and bone fragments as well as fabric, fibers, and other trace evidence of the victim may be stuck to the suspect vehicle.

Blood of the victim, often found on the undercarriage, must be typed with a sample from the victim. And the sobriety of the victim at the time of death always must be learned.

Follow-up investigation may include checking on persons with a history of speeding and reckless or drunken driving. Check with insurance agents, on vehicle sales and on transfers of registration. Consider press, radio, and TV coverage. And check tradesmen, deliverymen, garbage collectors, and the like. Their schedules may place them on the scene at the time or day of the accident.

Contact medical facilities to see if anyone has sought medical attention after an accident. Check stolen vehicle reports. A driver of a hit-and-run vehicle may report that the vehicle was stolen. Likewise, a hit-and-run driver may file a false accident report to cover a real accident.

BEATINGS

Beatings involve localized blunt force. Death from a beating is usually not planned. Beatings leave extensive bruises on a body. Autopsies often show ruptured vital organs and brain hemorrhaging. When a weapon is used in a beating, it often leaves distinct pattern injuries. They may help you learn the type of weapon used. When a person is kicked or stomped, the shoe often leaves impressions and clear cut marks on the clothing or body.

Sometimes, in a beating death, the body is moved and a simulated vehicle accident is staged. Or a vehicle is driven over the body to stage a hit-and-run accident. An autopsy may show that the injuries are not like motor vehicle injuries. Search the area. There may not be a point of impact. And a thorough search of the area may show evidence inconsistent with an accident.

DEATHS INVOLVING FIRE

Most deaths by fire are accidental. But connecting the death and the cause of the fire may show that homicide is involved. The fire may have been the cause of death or it may have been used to try to cover up the crime. If homicide is suspected or, in fact, the case, you must take steps to investigate for arson. Sometimes a person who commits a homicide

EXPLOSIONS

Most deaths from explosives are accidents resulting from blasts during training, construction, or military maneuvers. Homicides occur in which a deliberate blast is the cause of death. But more usually, explosions are used to hide a victim's identity or the real cause of death.

In an explosion a body may be shattered or hurled against a hard surface, causing blunt force injuries. It may receive many lacerations and punctures from pieces of the explosive device and nearby objects. It may be burned by thermal blast, flame, and steam. Compression injuries may occur in the lungs and elsewhere from swelling gases. Foreign material in the body must be examined at the autopsy to help learn the nature of the explosion and explosive device used.

FALLS

Deaths from falls are usually accidental. A person may be pushed or thrown from a height, but such events are rare. It is sometimes helpful to consider the blood alcohol content of the victim. And you must consider the height from which the victim fell and the distance from the base of the object to the point of impact. Do not overlook the fact that a victim found at the very base of an object may have been knocked out and rolled over the edge. An inspection of the point of departure of the body must get ample attention.

CRUSHINGS

Crushing deaths may occur in vehicle and industrial/construction accidents. These deaths may also occur from crowds in panic situations like fire in restaurants or theaters. The victims are usually the weak, the old, or the small.

with a firearm will try to hide the crime by setting fire to the scene. In cases of death by burning you should request that the remains be x-rayed. This may show the presence of a bullet in the body.

The two toughest facts to establish in a death by fire are the victim's identity and a

connection between the death and the cause of the fire. Investigating a death by fire is difficult. The victim may be mutilated by the fire, and the scene of the fire is often unavoidably disturbed by fire-fighting activities. Identifying unknown victims requires the help of pathologists. They can check skeletal remains for size, race, and sex distinctions. And they can compare the remains to dental records and X-rays.

Your investigation of a death from fire depends greatly on the pathologist's report of the cause of death. If the victim was alive at the time of burning, the autopsy will show inhaled smoke particles or carbon monoxide in the blood. The presence of these suggests life at the time the fire started, but its absence does not support death prior to the fire. A body is rarely burned to the point that a meaningful autopsy is not possible. Even if

death occurs quite some time before the fire is brought under control, and the body is badly charred, the inner organs are usually well-enough preserved. The cremation of a body takes one and one-half hours at 1600° to 1800° Fahrenheit. Even then bone fragments are seen. The ordinary housefire rarely exceeds 1200° Fahrenheit.

You must rely on the pathologist to identify wounds on a burn victim. There are many types of burn injuries that are misleading at first glance. The body may have a "pugilistic attitude." Its fists and arms may be drawn up like a boxer's stance from contracting muscles and skin. Bones fracture in an odd, curved way when cooling begins. Skull fractures may be present. But the cracks, radiating from a common center, are made by the release of steam pressure rather than blunt force.

DEATHS INVOLVING SEXUAL ASSAULT

Deaths may come from sexual assault, either directly or indirectly. The actual way the victim is killed may or may not clearly show a sexual reason. The most common means are strangulation and stabbing.

Anytime a violent death involves a woman or a child of either sex, sexual assault or abuse may be involved. Here, medical and psychiatric opinions must be requested. Bruising of the arms, inner thighs, and of the genitalia is commonly sustained by victims

of rape. Do not be misled by the fact evidence of normal sexual intercourse is not present. Anal and oral openings must be checked.

You must be alert for signs in the crime scene or on the body that might show sexual assault. These signs may differ broadly, from strange maiming of sex organs to merely an odd arrangement of clothing. Use sexual assault investigation methods, and closely inspect the crime scene and trace evidence to help track the criminal.

DEATHS INVOLVING TOXIC SUBSTANCES

Death from toxic substances may occur if substances safe only for external use are taken internally. And death from toxic levels of substances safe for internal use may occur if the substances are taken in amounts greater than the body can support. In either case, the death may be an accident, a suicide, or a homicide.

POISONINGS

The term poison is relative when describing a substance. A poison is any agent, that, when introduced into a living organism, causes a detrimental or destructive effect.

Accidental death may result from industrial, home, or food poisoning.

Sometimes poisonings result from gross negligence like that occurring in bad liquor or criminal abortion cases. Poisoning as the result of bad liquor is a broader, more organized manifestation of crime than an individual homicide. Solving these cases usually requires help from civilian authorities. These cases are not common to CONUS installations. But they have occurred in oversea areas where acceptable liquor is not available in quantity, and where there are black-market transactions in liquor. They also have occurred where insurgent forces have used poisoned liquor as a method of offensive operations against US military personnel.

Although homicide by poisoning is fairly rare, it must not be ruled out without a thorough investigation. Murder by poison can often be made to look like suicide. For example, the scene of a murder by poisonous gas may be fixed to look like that of a suicide or an accident.

Investigation of the crime scene is of special importance in the case of poisoning, because postmortem detection of poison may be difficult if its presence is not suspected. The presence of any one poison may be so hard to find that it may not be identified unless medical personnel have some idea of the type of poison they are looking for. The crime scene search for such poisons is most important.

When death is suspected to be the result of poison, it is important for you to give the pathologist performing the autopsy as much information as you can about the circumstances of death, the on-the-scene investigation, and the type of poison suspected. If you provide this information before the postmortem examination it allows the pathologist to use the right autopsy methods and to keep good specimens for toxicological tests.

The Army Medical Department must conduct a medical inquiry to learn the immediate cause of a death by suspected poisoning. Results of the inquiry are recorded in the postmortem report. The report is a full record of all that medical authorities know about the person who has died. It includes a record of—

- Clinical treatment given victim.
- Utterance, statements or accusations made by victim before death.
- Known facts pertaining to death.
- Immediate cause of death.
- Autopsy.
- Pathological and toxicological examination conducted to support the autopsy.
- Medical examinations of items of physical evidence.

The autopsy may tell the specific poison that caused the death, its concentration in the body, and the period of time the poison was in contact with the soft tissue before and after death. In some cases the specific poison may be unidentifiable because the dose was too small to detector the materials in the compound were the same as natural body products.

Ask the pathologist to obtain specimens of the victim's blood, bile, gastric contents, and urine. These samples can be sent to the USACIL, if they are not needed by medical personnel for diagnostic and autopsy purposes. The laboratory will try to learn if poison is present. Remember that body fluids found on a floor are likely to be contaminated. They are little use in toxicological tests for poisons. Nor is fecal matter a good source of specimen for poisons.

Take samples of food, medicines, beverages, narcotics, fuels, and chemicals that the victim may have consumed. Sinks, pipes, drain traps, garbage cans, cupboards and refrigerators may contain evidence of the poison. Poison also can be easily hidden in spices, sugar, flour, baking soda and the like. Soiled linen or clothing may contain traces of poison in stains from food, liquid, vomit, urine, or other matter. Collect spilled liquid in a filter paper and put it in a clean glass jar and seal it tightly. These samples must be submitted, despite an admission or

GROUPINGS OF COMMON POISONS	
ORGANIC POISONS	
Volatile	Nonvolatile
Ethyl alcohol	Alkaloids (heroin, cocaine)
Aniline	Barbiturates
Phenol	Glycosides (digitalis)
Gasoline	Synthetic drugs
Benezene	Miscellaneous (botulinus toxin, snake venom)
Chloral hydrate	
INORGANIC POISONS	
Metallic	Nonmetallic
Arsenic	Cyanides
Mercury	Flouride
Lead	Iodine
Other metals	Strong acids
	Strong oxidants
	Gases

confession, in any case that may involve criminal charges.

Collect containers that could have held a substance consumed by the victim. Include cups, glasses, and utensils that may have been used to prepare or serve food or drink. Check medicine containers for prescription numbers and the name of the dispensing pharmacy. In difficult cases you may want to take the contents of the medicine chest to search for materials that might have been taken in amounts large enough to cause toxic effects. Be sure to seize any items like hypodermic needles and syringes that could introduce a poison into a victim's body.

Identification and analysis of the poison may help locate its source. Few laymen know enough about poison in pure form to purchase or obtain any but the most well-known types. But many common retail products, not often thought of as poison, are toxic under some conditions. It is these materials that will be easily accessible to the poisoner. And their very availability may cause you to overlook them. Household sprays, paint and paint solvents, pesticides, liquid fuels, patent medicines, many antiseptics, and some cosmetics contain poison.

To learn the source of a poison, consider its availability and who would have easiest access to it. A poisoner usually uses a poison he knows. His familiarity with a substance can come from his occupation, hobbies, or past experience. Hospitals, dispensaries, laboratories, pharmacies, and illicit narcotics channels can be sources of medicines and drugs to be used as poisons. Offices, homes, and grocery stores contain cleaning substances, rodent and insect poisons, and medicines that may be toxic. Depots, warehouses, storage areas, farms, and similar places may be sources of rodent and insect poisons. Motor pools, fuel depots, and other places containing fuels with alcoholic bases and cleaning and solvent compounds may also be sources.

Locating a poison's source and determining its availability may suggest the mode of poisoning. Knowing a poison was contained in a food or beverage may help you ascertain where the victim ate the food or

drank the beverage. The place where a poison takes effect is not always the place where the victim consumes the poison.

There are rarely, if ever, witnesses to an act of poisoning. Consequently, you must gather as much concrete evidence as possible to find out if a crime was, in fact, committed, and if so, who committed it. Such evidence is not limited to the poisonous substance.

To learn key information about the poisoning you must run a background check on the victim and his activities. Be sure to interview persons who may—

- Have witnessed the act of poisoning.
- Know of a suspect's utterances or actions that could establish a motive for the crime.
- Know what the victim ate or drank within the time he probably received the poison.
- Have sold drugs or medicines to the victim or suspects.
- Know of the victim's movements before he was stricken.
- Be familiar with the victim's eating and drinking habits, use of drugs or medicines, and attempts at self-medication or treatment from sources outside military medical channels
- Be familiar with the victim's eating and drinking habits, use of drugs or medicines, and attempts at self-medication or treatment from sources outside military medical channels.
- Be familiar with the victim's financial status, family background, social life, or business associates.

OVERDOSINGS

Preliminary inquiry into a death may suggest that a victim died from an overdose of drugs. General observations of the crime scene, the victim, the victim's clothing, or conclusions about the victim's life-style may suggest this. Note the quality and quantity of food and liquor supplies, the contents of a library, the style and condition of the furniture and décor. An astute evaluation of these items can give significant and reliable clues to the life-style of the drug victim. These clues may clarify the circumstances of the death or at least give explicit information concerning the resident and the life-style he or she may have led.

A frequent finding in suicide by drugs, regardless of whether or not the victim was a drug abuser, is the presence of a single capsule or tablet near the body. The single dose, commonly called the “tell-tale” tablet is usually a sample of the medication which is used to produce the fatal result. The tell-tale is usually lying free, but it may be in the medicine vial or ampule on the night table, bedding, or floor. There is often no satisfactory explanation of why a person planning suicide leaves this type of clue. The presence of a tell-tale is not generally public information, so the suicide is not really copying the style of other suicides.

Anyone who has experience in death investigations will confirm the premise that drug abusers seem to have significantly higher suicide rates than nonabusers. Suicides among drug abusers may be precipitated by the onset of various legal processes and the fear of confinement. Thus, a legal paper compelling an appearance in court found near a body can be considered the equivalent of a suicide note. It may even be true that abusive use of drugs, especially those recognized as dangerous, may be a symptom of a number of psychiatric conditions known to have a high incidence of suicide. This is especially important to bear in mind as you attempt to classify the manner of death when the cause of the death is related to the acute effects of an intravenous injection.

Suspicion of intravenous drug abuse should be aroused when long-sleeved garments are worn when the weather does not justify it. A sleeve that is severely wrinkled in contrast to the other shirt sleeve may have been used as a makeshift tourniquet. In cases where drug death is acute and related to intravenous drug abuse, frequently the abuser will not have had time to conceal his drug cache or paraphernalia prior to his or her collapse. Thus, cellophane envelopes, balloons or paper packets, syringes, needles, bottle caps or other devices used as cookers, cotton balls, matches, and cigarette lighters may be seen. Sometimes a tourniquet or other constrictive device may be dropped after a victim collapses. And syringes are commonly still at the injection site or grasped in the hand.

Check the body for needle marks and scars. Most intravenous drug injections are made with very small (26-gauge) needles, which are designed for intradermal injection. If there have been only a few relatively recent injections not associated with puncture hemorrhage, you may need to use a magnifying glass to detect the punctures. In most chronic addicts, of course, there is no difficulty in detecting the tracks. In addition to the linear scars of intravenous drug use, flat ovoid or circular scars from lesions caused by unsterile injections given immediately under the skin sometimes may be seen. Chronic addicts may conceal punctures by injecting at unusual anatomic sites. They often inject in and around the genitalia, the nipples, the tongue, the mouth in general, and the scalp. Some addicts, who apparently do not care whether or not puncture sites are seen, may use the jugular vein in the neck to inject. Check the body for signs of nervous tension like the short, irregular edges of fingernails characteristic of nail biting or the yellow staining of the fingers characteristic of excessive smoking. Make detailed notations of pupillary diameter, even though this is not a reliable postmortem sign of drug abuse.

Toxicologic analyses do not always specify the exact doses of a drug. Thus, it can never be determined with any degree of specificity whether or not an abuser died accidentally from taking an overdose or decided to commit suicide by taking several doses at once. This is further confused by the fact that it is not really known how death is produced in a so-called “overdose,” because it is rarely possible to show a large excess of drug material.

If the cause of death appears to be accidental and there are no signs of criminal acts or negligence, record any evidence supporting your judgment. Sometimes accidental death from drugs does not lend itself to early, clear resolution. You must rule out all aspects of other than natural cause. Make sure no motive for murder was found and no threats could be learned. See that persons who may have had a chance to cause ingestion of the lethal dose, either by force or trick, have been searched for leads and that there is no credible sign that the death was other than accidental.

DEATHS INVOLVING INFANTS AND CHILDREN

Investigations of deaths of infants and children are particularly complex. You must proceed with great caution. You must fully coordinate your investigation with medical personnel, social welfare agencies, and SJA.

Suspicious deaths that involve infants and children can be grouped into three types - sudden infant death syndrome, infanticide, and battered child syndrome. Sudden infant death syndrome is believed to be the largest killer of children between one week and one year of age. The syndrome is also known as crib death, because this is where the death often occurs. In the past it was thought that these deaths were probably caused by the child smothering on bed clothes. Present medical research is investigating several theories, but none are yet proven. These deaths are generally held to be medically, rather than criminally, caused.

Infanticide is the criminal death of an infant by neglect or deliberation. Sometimes newborns are left to die of neglect in garbage cans, furnaces, restrooms, secluded places, and public dumps. Sometimes they are simply allowed to die at home or in a car in the expectation that they will be disposed of later. The cause of death in cases like these is usually a combination of acute congestion of the respiratory system, dehydration, and lack of basic life-sustaining care. Sometimes parents actively kill their infants. They may choke the baby with the umbilical cord, cup a hand over its mouth and nose, drown it in a bathtub, or drop it into a river or sewer. Sometimes, however, infants are stillborn or die soon after unattended births. Here, the criminal intent may only be to avoid reporting the birth and to illegally dispose of the body.

The battered child syndrome occurs in cases of child abuse. It accounts for a number of deaths of young children under violent conditions. Assigning criminal liability for deaths due to child abuse is often difficult. The victims are most often small children under three years old. If they are still alive when you first see them, they are usually unable or unwilling to describe what happened.

When investigating the death of a child, your first step is to get a brief background from the person finding the child. Where and in what position was the child found? When was the child last fed? Find out if the child had been ill or irritable the day or two before its death. Medical background, if known, can be of great benefit. If you are investigating an infant's death, try to learn of any problems during pregnancy and the infant's birth weight. Learn about routine visits to the doctor or well-baby clinics. Ask about the child's history of shots, illnesses, and hospital admissions. Learn the parents' ages, the number of children in the family, and if there is illness among family members.

Then check the body. Is its size consistent with its age? Consider the child's state of nutrition, sickness, dehydration, and cleanliness. Look for old scars and new or old bruises, lacerations, and abrasions. Examine the child's body, bed, and anything else relevant to the child. Include reports and interviews from neighbors, babysitters, and other children in the family.

You must find out how the child was cared for and who was responsible for the care. In most cases, there is one main person responsible for the care of the child. Get information about the family structure and number of relatives or persons frequenting the household. If the child has injuries, one of these parties may be responsible for the injuries. Include information about anyone who may feel competitive towards the child, like a mother's boyfriend. Information may be available from the local welfare agency and hospital and doctor records. Question the child's brothers, sisters, parents, neighbors, and babysitters. Many times a babysitter becomes the confidant of abused children, but from fear or disbelief she may not report the abuse that the children have related.

Cases of battered children often surface by conflicting statements of what the parents said happened and what the autopsy shows. You must listen for any conflicting statements, no matter how small. And in many cases the parents of a dead child have rehearsed their alibis.

The pathologist must have as much background about the child as possible before the autopsy. If there is no traumatic injury, the cause of death may be ruled as natural disease or crib death. When trauma from mechanical force is present, the distinction must be made between accidental injury and homicide. Bone injury may be caused by grabbing, gripping, and shaking the child by one or more extremities, as well as by blows to the child. Blunt force injury is the major cause of death of a battered child.

X-rays are crucial and vital. X-ray of new injuries will show the type and fracture, whether it be transverse or spiral from twisting forces. A radiologist can also find out the age of the injury. Some injuries to the head and stomach when used with X-ray evidence and autopsy findings of old injuries show repeated abuse and develop a pattern of injuries. Other injuries are of such a profound nature that accidental cause is hard to believe.

INFANTICIDE

Determining that a death is a case of infanticide is often difficult. Most such deaths are due to asphyxia, which also can occur from natural and accidental conditions. But when death occurs from strangulation or other forms of direct violence or when the circumstances show criminal abandonment or disposal with criminal intent, infanticide is strongly suggested.

Three questions must be resolved in a suspected infanticide: Did the infant breathe after birth? Would the infant have lived if given proper care? And, what was the cause of death?

At autopsy, the pathologist checks the infant's lungs to learn if it breathed after birth. Usually the lungs of a stillborn and a live birth appear quite different. But sometimes the signs are not distinct. Then the pathologist must make vast microscopic and hydrostatic tests to find out if lung tissues have been aerated. Even then, there is a chance that breathing may have occurred only inside the birth canal or the uterus and the infant later choked on the umbilical cord during birth or was suffocated by extruded

membranes, blood, or the mother's weight and position. Tries at artificial respiration also may account for air in a stillborn's lungs. Even when signs of asphyxia are present, the death may be wholly natural or accidental.

The pathologist medically assesses the completeness of the infant's prenatal development. He also checks for certain vital changes which occur immediately after birth. He considers the apparent general health of the infant and evaluates any congenital defects and injuries received at birth. From his findings he decides whether or not the infant could have lived if given minimal care.

Identifying the victim may be impossible without finding the mother. The body of an abandoned infant usually has no identity of its own. And identifying the mother is not easy; she probably hid the pregnancy and birth. However, a suspect may be found if she seeks medical attention after the birth. She can be medically identified as the mother of the victim, if her physical condition is compatible with the birth of the dead infant. And blood tests can show close blood grouping. At all autopsies of abandoned infants, blood samples are taken and analyzed for future comparisons.

If a baby has died from injuries, you must check the child's medical record to see if the injuries were treated or hidden. Try to learn if the mother showed signs of mental depression after the birth of the child. In such a case she would be capable of seriously or fatally injuring the child or even herself. You should also review the mental history of the father. Medical personnel, neighbors, and friends of the parents can give you information about the temperament of the family. And military or civil police will have records of any complaints or past investigations of the parents.

BATTERED CHILD SYNDROME

A major step in looking into the death of a battered child is to be able to spot signs of battering.

The victim of abuse is commonly an infant, most often under 3 years of age. One child in

the family is usually the main target of abuse. This child may be the product of an unwanted pregnancy or a premarital pregnancy. Or the child may be unwanted for other reasons. The home may be basically clean and the remainder of the children in it well cared for, fed, and clothed. It should be noted that sometimes the family is financially set, well educated, and socially oriented.

Many times battering parents were targets of abuse in their childhood. A statement such as, "If you think he is mistreated, you should have seen the way my old man kicked me around," shows a trend of child abuse from generation to generation. Parents raise their children the way their own parents raised them, because they know no other way. A battering parent often shows signs of emotional immaturity and mental and environmental stress.

Another factor which you must recognize is the presence of an extreme sense of competition between the parents. This competition can cause resentment that is taken out on the child. In most abusive families there is a constant stress of one kind or another.

Emotional outbursts from aggravation or frustration are responsible for many abusive deaths. Most parents feel some degree of guilt even though their children have been injured accidentally. They make statements like, "I shouldn't have bought him such a big bike," or "Why didn't I watch him more closely," or "Why did I let his bath water run so hot." The battering parent, on the other hand, often shows anger and a hostile, argumentative outlook. They may cry harassment on the part of an investigator.

You must assess the parents to try to detect undue frustration, belligerence, or nervousness when you suspect child abuse. But you must not overlook the chance that a child was beaten by a brother or sister. A small child, 18 months and older, may think and feel that its position in the family has been invaded by the arrival of a new baby. Parents may unthinkingly talk of the new baby in a way that the older child will resent. A child has many toys and objects at hand that can cause battering injuries.

The nonfatally battered child is hard to identify. This child may appear at medical facilities with extensive bruises, a broken arm, a cut lip, or a black eye. These injuries are easily explained by parents. A fall or a toy thrown by an older child are excuses often used by battering parents. Only repetitive injuries of this type can alert the doctor to a battered child. Often, to avoid discovery, the parent will take the child to a different doctor or hospital each time.

Some battered children show no outer signs of injuries. Others show extensive injuries. There may be deep bruises of the face and arms. Deep lacerations are rare. They are probably only seen when a blunt object is used to strike a child on the head or face. Lacerations on the inside of the mouth are more common, caused by them biting themselves when hit.

Almost all children have one or two scars from falls, but multiple scars on a small child shows a pattern leading you to conclude abuse. Small round burn scars may indicate cigarette or cigar burns. Burns on the buttocks may occur when an angry parent places a child on a hot surface to dry his wet pants. Sometimes a parent bites the child. The bite often leaves a pattern of human teeth marks on the child.

Your main tool is your eyesight. Look the child over, paying attention to signs that the child was abused. Look at parts of the child's body that are normally covered by clothing, like the arm pits and the inside of the upper thighs. Check the soles of the feet for burns. Look at the child's nutritional state, as well as his general cleanliness to check the parents care of the child.

Most of a battered child's internal injuries occur in the head or the stomach. The face and scalp may not show outer signs of abuse. But heavy hemorrhaging may be present under the skull. Subdural hematomas, common among battered children, take moderate to severe force to make. They may occur from a child being dropped to the floor or beaten repeatedly on the head. Or they may occur from a child being held by the ankles and swung against a wall. Or they may occur from a child being dropped down a staircase.

Blunt force injury to the stomach often causes a lacerated, torn, or ruptured spleen spilling into the peritoneal cavity. The small and large bowels may be perforated, causing the feces to enter into the cavity. Pancreatic substances or bile may be sent to the stomach by injuries to the liver or pancreas. All of

these injuries will cause much pain, crying, listlessness, shock and finally a coma. And because the lining of the stomach is soft, these injuries may not be apparent. One clue to intra-abdominal injury in the absence of obvious skin injury is a swollen stomach.
