

FIRST-AID FOR HORSES

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Wounds are commonly seen in horses as a result of falls, kicks or bites by other horses, trauma and lacerations due to fencing, and colliding with jumps. The horse, most importantly, must have proper care in the treatment of wounds. Due to the nature of the animal, the horse can incur many more injuries (or sequelae) as the result of a mishap. Therefore, it is quite important that the caregiver evaluate the entire condition of the animal in addition to the primary wound.

Such questions you should ask are: Is the horse depressed and not eating? Is there extreme blood loss? Does the horse appear alert but unable to comprehend its surroundings? Is the horse violent as a result of the condition? These factors can help you determine whether or not immediate veterinary care is needed.

Mistreatment could result in death, exuberant granulation, excessive scarring, blemishes, and sometimes unsoundness. Wounds below the knee and hock require careful treatment to prevent complications. A wound may be closed where the skin remains intact, i.e., bruising, sprains, and ruptures, or open with various degrees of skin damage.¹

Open Wounds

Open wounds can be grouped according to the nature of the damage. Such examples of these injuries are incised wounds, lacerations, tears, punctures, penetrating wounds and abrasions.

Incised wounds have clean straight edges and often bleed quite freely. There is usually very little associated bruising. They normal-

ly heal quickly and simply. Examples are cuts caused by sharp pieces of metal or glass.

Lacerations and tears have torn rather than cut edges and may be irregular in shape. There is usually some associated bruising and the amount of bleeding is variable. These wounds often result in tags or flaps of skin. The blood supply to these skin edges is compromised, resulting in death of the skin (necrosis) at a later stage. Lacerated wounds are often the result of getting caught on protruding nails, posts or wire.

Puncture wounds can be more serious than they appear and are characterized by a small skin opening with soft-tissue penetration to a variable depth. They can be caused by bites, nails, pieces of wire, pitchforks, and other instances of sharp, narrow diameter objects in the horse's path. Hoofs are particularly at risk.

The object causing the puncture wound can carry with it to the depth of the injury, either foreign material, as a wood splinter, or bacteria which can become established and cause deep infection. The skin wound may be so small as to not be seen. Therefore, should a piece of wire or wood penetrate the body, especially the sole of the foot or frog, the exposed portion should be cut off and the area wrapped or secured. The veterinarian should then be called to evaluate and/or x-ray the area to determine if a vital structure has been exposed or traumatized (i.e., navicular bursa, flexor tendon, or inside of the thoracic or abdominal cavity). If the object were simply removed or pulled out, it could be several days before complications were noted. Isolation of the complete extent of the injury may be impossible at this point.

Simple puncture wounds should not be probed or explored excessively because such action may disrupt blood clots or force any foreign material deeper. This type of wound always requires the administration of a tetanus vaccination. Drainage must be



established and encouraged so the wound can heal from the inside of the wound toward the outside. A poultice can be applied to draw out any contaminating material and aid in keeping the wound open.¹

Penetrating wounds enter into one of the body cavities, such as the thorax or abdomen, and are very serious. There may or may not be injury to internal organs. Emergency first aid in these cases involves covering the wound with sterile gauze or bandage to prevent further contamination and/or escape of organs or tissues, and to reduce the amount of air that can enter into the body cavity, decreasing the incidence of infection. Should a foreign penetrating object be exposed, it should be secured and evaluated by a veterinarian immediately as with puncture wounds.

Abrasions are very superficial skin wounds resulting from rubbing or scraping against an irritant surface. Examples are saddle chaffs and shoulder rubs from ill-fitting saddles and blankets. Abrasions may also result from a horse falling on the road surface. Although the skin injury may seem superficial, in these instances, the bones of the limbs, which have poor soft tissue protection, may be damaged even if not exposed through the wound. These wounds should be gently but thoroughly cleansed and, if possible, lightly bandaged.

Treatment of Open Wounds

Open wounds involve damage to some of or all the following: skin, muscles, nerves, blood vessels, tendons, bones and internal organs. All wounds, unless incurred during a sterile surgical procedure, are contaminated by bacteria, which could result in an infection if not controlled.

The main goals in wound treatment are: to control hemorrhage; to turn the contaminated wound into a clean one; and to promote rapid wound healing.

Hemorrhage, to a limited degree, helps to flush a wound free of contaminating material. It may be difficult to decide whether it is more important to try to control the hemorrhage or cleanse the wound. This depends on the degree of hemorrhage

and the degree of contamination. If bleeding is minor, cleanse the wound and apply a sterile dressing, which will help to control the bleeding. If bleeding is more extensive, there are several methods available to reduce or stop it completely.

If a large vessel is severed, it must be ligated before excessive blood loss occurs. If an artery is involved, bright red blood will escape in spurts. If a venous laceration occurs, the blood is usually darker and flows continuously. The damaged ends of the vessel should be grasped in forceps and a sterile ligature placed around them tightly enough to control the hemorrhage and not slip.

Smaller vessels, especially arteries, will seal if clamped for several minutes with a pair of forceps. Twisting the forceps until the vessel stretches and breaks causes elastic recoil. This can be used to seal many smaller arteries and veins, although veins lack the full elasticity of arteries and may not seal without ligation.

Pressure may be applied directly to the wound by placing a clean dressing to it and holding it firmly in place until the bleeding stops. A pressure bandage with several layers of absorbent material can be applied over the wound. This must be left in place until the bleeding has stopped. The pressure bandage must be applied firmly, but should be removed once hemorrhage has stopped to avoid interfering with circulation. Tourniquets should not be used unless the hemorrhage is very severe. If applied incorrectly, a tourniquet can exacerbate the bleeding by interfering with venous drainage from the limb.

Some substances can be applied topically to the bleeding surfaces to control hemorrhage. Silver nitrate, the most common of these substances, works by precipitating proteins in the damaged vessel and allows clotting to occur. Pressure should be used to reduce hemorrhage and the wound cleansed before the substance is applied. Excessive amounts of blood, or a blood clot, will interfere with the effectiveness of the silver nitrate. Substances may also be applied locally to encourage clotting. They include reconstituted cellulose¹ and absorbable gelatin sponges.² They act as a framework on which a clot can develop.

They can be left in a clean wound since they are gradually absorbed by the body.

Simple hosing is the best way to initially cleanse many wounds, especially if they are large or heavily contaminated with dirt or clay. Hosing produces a constant flow of water in large volumes and under variable pressure. Excessive pressure should be avoided as it may force foreign material deeper into the wound or open up new tissue planes, allowing the spread of infection. The skin surrounding the wound should also be hosed clean of mud and debris.

Smaller wounds, and larger ones after initial hosing, should be gently cleansed with a diluted solution of a mild skin antiseptic in warm water and clean cotton. Suitable solutions can be made using one percent iodine-based washes such as Povidone Iodine or Chlorhexidine. If possible, the surrounding area should be clipped before cleansing, with care being taken so that hair does not enter the wound. Packing it with sterile lubricating gel or, if applicable, a clean gauze should prevent contamination.

After a wound has been cleansed, the remaining (often embedded) foreign material and dead or damaged tissues may need to be removed (debridement). Physical or chemical restraint, with or without use of local anesthesia, may be needed, depending on the nature of the wound, the amount of contamination, the facilities available, and the temperament of the patient. A pair of tissue forceps, a sharp pair of scissors and a scalpel are essential instruments for debridement. If the wound is extensive, this procedure may have to be repeated at a later date as some tissues will die despite corrective treatment. During debridement, all care must be taken to preserve tendons, nerves and blood vessels. Tags of skin or other damaged or dead tissue should be removed.

Some wounds, especially puncture wounds in which there is a large gap left due to loss of normal tissue, will require drainage. This drainage must be maintained for a variable period of time to allow for proper healing. This may be achieved either by leaving the wound open, enlarging the actual wound, or by creating a second skin opening adjacent to the

wound and thereby establishing drainage with the use of a drain. These drains are usually composed of hollow latex tubing which is sutured into the wound with one or both ends communicating with the outside. The drains allow the passage of fluid and debris from the depth of the wound. However, care should be taken with placement and protection to prevent the drains from being torn or acting as routes for infection to enter the wound. They should not exit through the wound itself as this will usually interfere with healing.

A clean wound will begin the process of healing immediately after the injury. Wounds heal in several ways, depending upon the nature and the site of the injury. A laceration created by blunt trauma will be star-shaped in appearance and have attending swelling. Closure of this type of wound generally meets with failure. A laceration with straight edges created by a relatively clean piece of sheet metal is probably best managed using minimal debridement followed by suture repair (stitches).⁴

Healing by first or primary intention can occur in non-contaminated incised wounds where the edges are or can be brought together. For this type of healing to occur, the wound must be fresh and sutured to bring the skin edges into direct contact with each other.

The wound should be sutured as soon as possible after the injury has occurred. The age of the wound is important because delayed treatment allows organisms to proliferate and invade. Several estimates exist for the so-called "golden period," or the elapsed time from injury to closure, after which suturing a wound would do little good. This time period is generally six hours, however; adherence to a specific time limit is inappropriate because several factors influence bacterial proliferation, tissue invasion and wound dehydration - things that adversely affect the success of stitching. For example, wounds contaminated with clay, or wounds where tissue has been crushed, are 1000 times more likely to become infected than clean, sharp lacerations.⁶

The location of the wound is also important when deciding whether to treat it by suturing; the greater the density of the regional vasculature

(blood supply), the greater the resistance to infection and therefore the greater likelihood of successful closure. This is why contaminated wounds of the head can often be successfully closed.^{7,8}

If the skin edges are not under tension, a simple interrupted suture pattern may be used. The former permits better apposition of the skin edges than the simple continuous suture pattern; also, if a knot fails, only one suture is lost. The continuous suture pattern, however, can be inserted more quickly.

Subcutaneous and deeper tissues may be brought together using an absorbable suture material before the skin is closed. The elimination of potential spaces under the skin (dead space) dramatically speeds the healing process and reduces the incidence of infection.

If the edges of a wound can only be brought together under tension, or if extensive swelling is likely, tension sutures, using either buttons or plastic tubing to spread the pressure over a larger area, may be used. The sutures should remain in place for at least 10 days, and longer if necessary. If the wound cannot heal by primary intention, it must undergo the processes of granulation, contraction and epithelial (skin edge) cell wall multiplication and migration. This open wound healing is called healing by second intention.

Large skin and tissue defects on the body tend to heal with relatively little scarring because the skin is loose and wound contraction can occur readily. On the limbs, however, there is little or no loose skin and wound contraction is limited. The formation of excessive granulation tissue (proud flesh) in wounds to the limbs also interferes with healing, as the epithelial cells cannot migrate over the proud flesh to create a new skin covering. Confinement, along with protective bandaging and immobilization, will help reduce healing time when a wound extends over a joint space. Little can be done otherwise to facilitate wound contraction on horses' limbs, and skin grafting may be necessary to complete healing.⁹

Once proud flesh is present, it must be removed surgically so that the granulating bed lies below

the epithelial skin edge to allow for contraction and migration of the skin surface over it. Application of an antibiotic-steroid ointment underneath the pressure bandage inhibits excessive granulation tissue development without delaying epithelial cell migration.

Bandaging wounds serves many purposes. It immobilizes the region to aid healing. It keeps the wound clean and protects it from infection and further trauma. Pressure, as applied through a bandage, can aid in reducing swelling and in controlling hemorrhage. However, not all wounds require or are suitable for bandaging. Some are best left open, kept clean and free from debris, and treated with either a wound powder or spray and allowed to granulate. Wounds on many parts of the body and upper limbs are treated this way. Where rigid immobilization is necessary, for example, with leg wounds where a tendon is exposed or damaged or with some wounds around the joints, a castor splint might be applied to the limb to allow the tissues to heal.

All dressings should be non-adhesive and may be impregnated with sterile petroleum jelly or antibiotics. Padding, such as rolled or sheet cotton, should be used to help distribute the pressure of the bandage and absorb any discharge from the wound. There are many types of bandages available: from light stretch disposable bandages,³ non-disposable stable bandages, to adhesive elastic bandages.⁴ Care must be taken not to apply them too tightly without proper padding as this may interfere with the blood circulation to the area.

Systemic antibiotic treatment may be necessary in serious or heavily contaminated wounds. Penicillin and trimethoprin-sulphonamide combinations are frequently used. Anti-inflammatory drugs are also occasionally indicated as they help to reduce pain, inflammation and swelling. Consultation with your veterinarian is strongly advised as many factors currently exist today as to the drug, route and frequency of administration for different wounds.

There are few better ways to stimulate fast healing than keeping a wound clean and "healthy." However, there are many factors which can delay

healing. The most important of these is infection, which results in further tissue damage, discharge and inflammation. An infected wound must be thoroughly cleaned, drainage established, and antibiotics administered. Topically applied antibiotics are often unable to reach the bacteria in infected wounds because of the barrier produced by dead tissue and discharges. Systemic antibiotics must be used instead.

Other local factors which may affect healing include blood supply to the wound, associated soft tissue damage such as bruising and hematomas, skin temperature, and the availability to loose connective tissue to allow wound closure. Many systemic disorders may also interfere with wound healing. These include deficiencies of protein, vitamins A and C, and Zinc. Age, some hormonal, cardiac, liver and kidney abnormalities also affect wound healing.

Closed Wounds

Closed wounds include bruises, contusions, sprains and muscle and tendon rupture. Contusions result from a blunt force causing hemorrhage, bruising and edema without breaking the skin. Signs of contusion include swelling, heat and pain at the site of injury and discoloration of the overlying skin if it is depigmented. Kicks from other horses result in contusions with the formation of hematomas under the skin due to leakage of blood from damaged vessels. Treatment of contusions involves initial immobilization of the region and cold hosing or the application of ice packs to reduce heat and swelling. Subsequently, applying heat to the area encourages the absorption of excessive fluid.

Large hematomas often require draining, but this is best left for seven or ten days to allow hemorrhage to subside. The incision for drainage should be made in the lowest point of the hematoma and should be kept open by vigorous cleaning until there is no further discharge from the wound. If allowed to close early, the hematoma cavity may refill with blood or fluid and require re-draining. Other closed wounds include sprains, ligament tears or ruptures, and muscle tears or ruptures.

Electrical Shock

Electric shock usually results in death with little

external evidence of injury apart from a line of singed hair or burned skin along the course of the current. Occasionally, more obvious evidence of lightning strike is present, such as a visible strike to a nearby tree or a branching pattern on the horse's hair from the point of lightning strike. Rigor mortis is usually present for a very short period only as the body decomposes rapidly. It may be difficult to differentiate lightning strike from other causes of sudden death unless further tests are performed.

Surviving animals usually appear dazed or unconscious with severe depression of both cardiac and respiratory functions. Breathing is slow, labored or gasping. The pulse is weak and slow. The horse's pupils may be dilated or constricted, and convulsions are common. A varying degree of paralysis is also common. Its rapid disappearance is a good sign of recovery. Recovery may take hours or days, but in some cases, permanent paralysis or blindness may result.

Electric shock can also arise from contact with overhead cables, wire fencing or other sources of electric current, particularly if the immediate area is wet. At death the heart appears flabby and there is marked congestion of the lungs, heart and other organs.

Treatment for a surviving victim of electric shock or lightning strike is largely a matter of good nursing care. Plenty of bedding, and food and water should be available. The animal's condition should be constantly monitored. Support bandages on all limbs may be useful if the animal is weak or paralyzed in one leg.

First Aid

Every responsible horse or pony owner should have a basic first-aid kit. It is best kept in a small, clean, preferably waterproof box. This ensures that the equipment remains clean and dry and can be taken with the horse whenever it travels away from home. These articles are for dealing with any minor injuries which may occur either in the stable or paddock, or while out riding. Such injuries are usually superficial cuts and bruises, such as those resulting from kicks, wire cuts, overreaching, thorns, etc. If the injury is severe, first-aid

should be only a temporary procedure and a veterinarian contacted as soon as possible.

An antiseptic cleansing agent such as Povidone-Iodine⁵ or Chlorhexidine⁶ is essential for cleaning wounds. Hosing is generally a very good way of flushing out debris from the wound area; the antiseptic solution can then be applied at the final stage. If a hose is not available, the antiseptic should be added to a bucket of clean, warm water. The wound should be cleaned thoroughly, starting at its center and working outward. A powder or spray dressing⁷ can be applied to prevent infection and aid in the drying of the wound. If the horse objects to the spray, it can first be applied to some cotton away from the animal and then applied to the wound. Some sprays contain one percent gentian violet⁸ which is an effective antifungal agent. These sprays are particularly useful when treating areas on and around the feet. Do not use powders or sprays on or around the eyes of a horse, however.

An antiseptic ointment is useful for applying to mild skin problems such as minor skin lacerations and abrasions that do not involve puncture wounds. Ointments are less effective in warm weather due to the heat which causes the preparation to escape from the wound.

It is useful to have a good selection of open-weave, adhesive and disposable bandages. Most of these can be obtained from your veterinarian.

After the injured area has been cleansed, bandages are employed to control the hemorrhage, keep an open wound clean, and for support and protection. Most wounds which involve the full thickness of the skin should be bandaged if possible, as this prevents dirt from entering and helps to hold the edges of the wound together.

The bandage gives support and light pressure without restricting movement. Adhesive bandages help to hold a bandage onto highly mobile areas, such as the knee or hock, and should be applied directly to the skin above and below the bandage and over the bandage itself.

All bandages must be applied with care. It is

important that there is adequate padding (such as cotton) and that they be kept flat and smooth, not wrinkled. Except in cases of severe hemorrhage, when they may be used tightly for short periods, bandages should be applied with a firm, even pressure. Overtight bandaging can cause disruption of the blood circulating to the skin and underlying tissues and result in necrosis and sloughing.

Sterile, non-adherent dressings are applied before bandaging where the skin surface is broken. Some of these dressings are impregnated with petroleum.⁹ The petroleum preparation should only be used when the wound is fresh rather than over an extended period as it will keep the wound too moist and encourage excessive granulation tissue.

Practical cotton is useful for cleaning wounds. It should not, however, be applied directly to an open wound in a bandage as it will stick and interfere with proper wound healing. A non-adherent dressing should be applied first, and covered with a layer of rolled cotton before bandaging. This will absorb any discharge and protect the wound from trauma.

Curved, blunt-ended scissors are useful for cutting away hair from a wound. Straight scissors are useful for cutting tape and bandages. Electric clippers with a number 40 blade are very effective in trimming the hair very closely to the skin.

A poultice¹⁰ may be applied hot or cold. Hot ones are used either to increase the blood supply to an area, to draw out infection as with a sole abscess or puncture wound, or to encourage an abscess to open. Cold ones decrease inflammation associated with swelling and bruising caused by blows or kicks.

A clinical thermometer should be used to measure a horse's temperature if it is showing symptoms of any illness or not eating. The mercury is shaken down and the bulb of end of the thermometer placed in the horse's rectum for at least one minute. The normal temperature variation for the horse is 99.5-101°F. A rise in temperature of 1.5°F or more above normal should be considered a cause for concern and a veterinarian consulted.

All eye injuries should be treated as an emergency and a veterinarian consulted immediately. Do not attempt to cut off or clean flaps of skin or try to remove a blood clot following an injury to the globe itself. The eye may be flushed with an eye wash solution.¹¹ Should any foreign matter remain, one can attempt to carefully lift it out with a moist cotton-tipped applicator.

Broken bones in a horse generally remain a major problem for repair. When a fracture is suspected, a veterinarian should be called to evaluate the nature and extent of the damage. Fractures below the knee or hock that are in danger of becoming more unstable can be partially immobilized by wrapping a thick layer of towels around the leg and incorporating four to six inch PVC pipe over the towels with self-adhering tape in a firm fashion.

Common Conditions Resulting in Injury

A. Inadequate Stabling

1. Barns, stalls, fences and gates either too small or not designed properly for the horse.
2. Improper choice of building materials (poor quality wood or metal, barbed wire, hog wire, etc).
3. Uncapped steel posts.
4. Sharp edges or corners on waterers and feeders.
5. Lack of or improper bedding.
6. Protruding nails, bolts, etc.
7. Facilities in poor repair.
8. Miscellaneous equipment stored in pastures, etc.

B. Undesirable Husbandry Practices

1. Keeping horses in overcrowded conditions.
2. Allowing aggressive horses in group conditions.
3. Lack of adequate group feeder space.
4. Use of wire to hang waterers or feeders.
5. Improper tying of horses: undesirable tie posts, rails, knots, or tying too long or too low.



Footnotes

- ¹ Surgicell, Surgikos. Johnson & Johnson, New Brunswick, NJ.
- ² Gelfoam. The Upjohn Company, Kalamazoo, MI.
- ³ VetWrap. 3M Animal Care Products, St. Paul, MN 55144-1000.

- ⁴ Elasticon. Johnson & Johnson, New Brunswick, NJ.
- ⁵ Betadine. The Purdue Frederick Co., Norwalk, CT 06850
- ⁶ Nolvasan. Fort Dodge Labs, Inc., Fort Dodge, IA 50501.
- ⁷ Furox. SmithKline Beecham, West Chester, PA.
- ⁸ Xeroform. Sherwood Medical Industries, Inc., Markham, Ontario L3R 8H1 Canada.
- ⁹ J. Telfa. The Kendal Co, Boston, MA 02101.
- ¹⁰ Antiphlogistine. W.F. Young, Inc., Springfield, MA 01103.
- ¹¹ Tears Plus. Allergan America, Hormigueros, Puerto Rico 00660.

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