

# FIRST AID FOR PUNCTURE WOUNDS

Here's what to do to prevent a seemingly minor injury from endangering your horse's life.

*By Joy Silha*

**T**he problem with puncture wounds is that most of them look innocuous. There's often a small round hole and a minimal amount of blood—certainly sufficient evidence of injury, but not the sort of signs that trigger alarm. Yet depending on its location and the extent of damage beneath the skin, a puncture wound can be life-threatening for your horse.

Several characteristics make puncture wounds dangerous and difficult to treat:

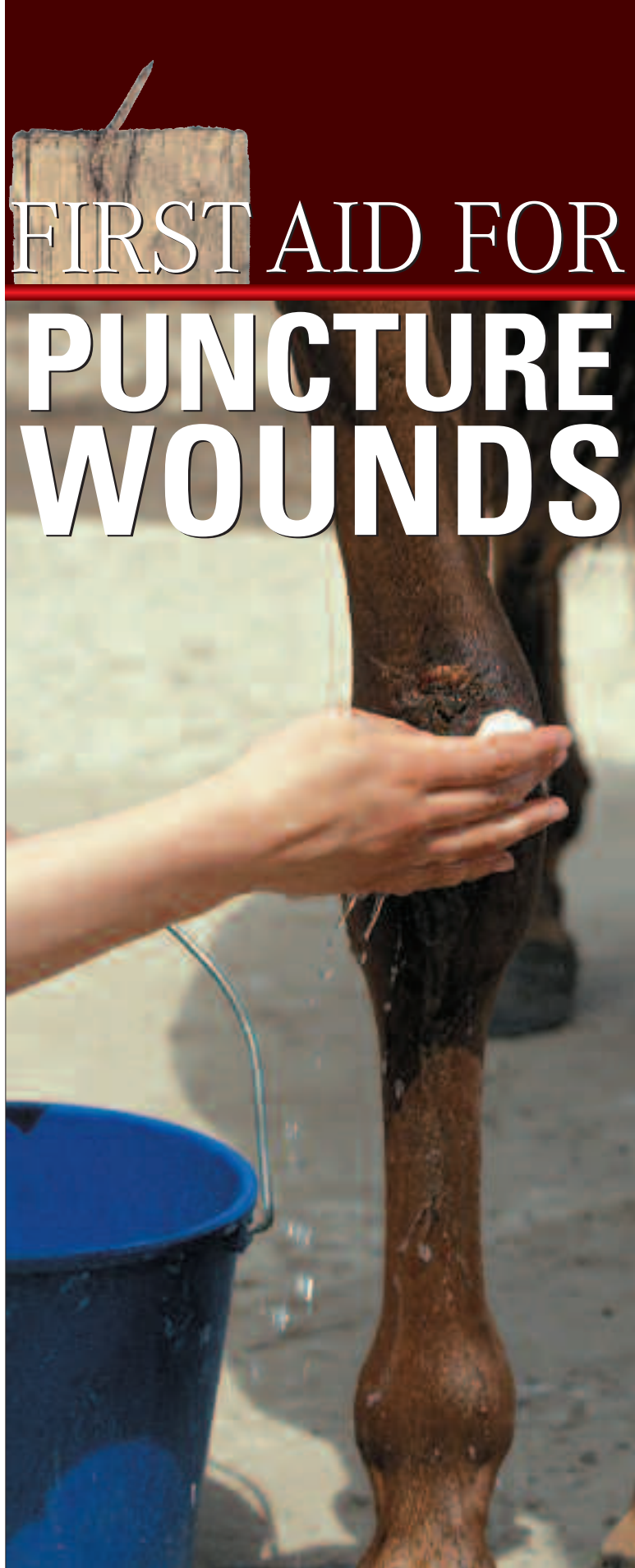
- ◆ They are inflicted by items capable of carrying dangerous bacteria deep into body tissue.
- ◆ Deeper than they are wide, they do not readily drain, creating an environment where invading bacteria can flourish.
- ◆ Healing starts from the skin inward, so that the bacteria can become trapped and produce local abscesses or deep-seated infections that may spread to other parts of the body.
- ◆ Any piece of a puncturing item that remains in the wound thwarts healing and rehabilitation; dead tissue has no exit.

## The worst places for punctures

The real menace of a puncture wound is not so much its cause as its location. Every puncture is a potential **Red Alert**, so call your veterinarian immediately when you detect that your horse has suffered one. Waiting could have disastrous consequences, especially if a joint or body cavity has been breached; without treatment in the first few hours after injury, complete recovery is unlikely.

Puncture wounds at the following locations pose the greatest risk for a horse:

**Joints.** An item that penetrates a joint and the



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synovial sac within it may cause the clear to deep-yellow lubricating fluid to leak out. An infected joint may develop arthritis or osteomyelitis, a destructive bone infection. Both conditions are painful, difficult to treat and often result in permanent lameness.

**Tendon sheaths.** A puncture to the thin tissue that covers tendons and ligaments may introduce bacteria; the resultant infection will be quite painful and can lead to permanent lameness. Particularly vulnerable are the digital tendon sheath and the carpal canal. The digital tendon sheath runs from the navicular bone to the coronary band, over the pastern and fetlock to above the fetlock joint. The carpal canal runs just above to just below the back of the knee (carpus).

**The chest.** A large puncture to the chest can collapse the lungs and cause asphyxiation.

**The abdomen.** An abdominal-cavity puncture

and any subsequent infection can be especially serious, considering the vital organs located there: the liver, spleen, kidneys, large colon, stomach, small intestine, duodenum and cecum.

**Eyes.** A punctured eye is extremely painful. The iris protrudes and the eye may appear to be popping out. In actuality, the inner contents may be bulging through the wound. Surgery is required, and although the eye sometimes can be saved, a horse's vision often is permanently affected.

**Feet.** Punctures to the foot—which includes the bones, joints, tendons and ligaments encased within the hoof wall—are quite common, yet many escape detection until a horse is in pain and lame. Because of the particularly destructive nature of an infection or abscess in any synovial space, the most serious foot punctures go through the frog to the navicular bone and navicular bursa, the deep digital flexor tendon and the coffin joint.

## Worst places for punctures

### Eyes

Puncture is extremely painful. Surgical repair is required.

### Chest

A punctured lung may collapse, causing the horse to asphyxiate. Potential for shock is great.

### Joints

Essential lubricating fluid may escape through a puncture. Infection is likely; may lead to permanent lameness.

### Abdomen

Many vital organs are at risk of life-threatening damage. Potential for shock is great.

### Tendon sheaths

Resultant infection is quite painful and can lead to permanent damage.

### Feet

The most serious punctures go through the frog into the inner structures of the hoof.



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## What to do

► **Rule out shock:** As you wait for your veterinarian to arrive, take stock of your horse's physical condition as well as his behavior to gauge the severity and effect of his wound. Serious punctures can produce bodywide effects in a relatively short time as normal organ function slows in an attempt to deal with the trauma. Without immediate and aggressive treatment, a horse with a puncture wound of the chest, belly or eye can go into shock. Signs include trembling, anxiety, clammy ears and a weak, fast pulse. Do not attempt to move a horse who is in shock. Make him as comfortable as possible and inform your veterinarian of the urgency of your situation.

► **Assess behavior:** If shock is not an imminent threat, assess your horse's demeanor for clues to the extent of his injury. Is he frantic, relatively unconcerned or unusually lethargic? Is he unable or reluctant to move or is he lame for just a few steps then willing to go on? Whatever the case, keep him calm and, if practicable, lead him to an area where he'll be safe and unlikely to have reason to become agitated. Unless he's flailing violently and risking further injury, don't give him sedatives or painkillers. They'll mask signs that provide important information for your veterinarian. They also may cause your horse to overuse his wounded part.

► **Examine the site:** Now take a good look at his injury. It's best not to touch it, particularly if the item responsible is still lodged in the wound. At the very least, you're likely to cause your horse greater pain and risk losing his cooperation. Handling the object might cause it to break off within the wound. Manipulation—including cleaning or flushing the injury in some cases—could drive the penetrant deeper, inflicting greater damage to nerves, blood vessels, organs or bone. Removal may also worsen bleeding.

► **Prevent further injury:** To avoid driving the item deeper, generously pad the area around the wound, then cover it with a clean piece of gauze or cloth to protect it from further contamination and control any persistent bleeding. If you're dealing with a nail protruding from the sole, hold the foot up or duct tape a block of wood to the bottom of the hoof so the nail cannot be pushed in deeper.

In most instances, it's best not to remove the object from a puncture wound, even if it is protruding from a horse's eye. Many veterinarians prefer to see the item in place so they can track its path to determine the degree of damage and the potential for infection. Regardless of location,

## Prevention

### Guard against tetanus



A puncture wound is the perfect incubator for tetanus spores, so a veterinarian likely will administer a tetanus booster to an injured horse. If the horse hasn't been immunized against tetanus in the last 18 months, the veterinarian may administer tetanus antitoxin.

A rigid paralytic disease, tetanus is caused by *Clostridium tetani*, an anaerobic bacterium present in soil and feces. When multiplying within a wound, the bacteria release a potent toxin that travels through the bloodstream to the central nervous system.

The incubation period ranges from several days to more than a month. The initial signs are muscle stiffness followed by tightening of the jaw. As the disease progresses, a horse experiences spasms, rigid limbs and protrusion of the third eyelid. His nostrils flare and his tail and ears stiffen. He may look like a sawhorse and fall with his legs extended.

Tetanus is very serious, with a low survival rate. Horses that recover require huge doses of antitoxin as well as constant nursing treatment for a prolonged period.

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### WOUND INVADERS:

Tetanus is caused by *Clostridium tetani* bacteria, which live in soil and feces.

puncture wounds almost always develop some degree of infection. Certain materials increase the possibility. Wood is especially dangerous because it leaves splinters in tissue. Wire can break and shed rust or zinc fragments that become embedded. A sharp object that was lying in manure carries more bacteria, increasing the threat.

► **Remove if you must:** There are rare instances when it is advisable to remove a penetrant before your veterinarian arrives:

- It's causing the horse to panic.
- Movement might drive it deeper into the wound.
- It's an item, such as rebar or a metal fence post, that is obviously unbreakable.
- The wound is superficial—the track of the item is parallel to the skin.

To remove the object, pull in the direction opposite of entry. Once it's out, examine it for missing pieces and save it for your veterinarian to examine. Make a mark on the item to indicate how deeply it was embedded. It is also helpful to mark the wound site so your veterinarian will be able to locate the puncturing item's track.

► **Clean the site:** If your horse is calm, clean the area around the wound by flushing it with physiologic saline solution or plain water. Clip the hair if possible to provide your veterinarian with an unobstructed view of the wound and to facilitate drainage.

### Veterinary treatment

When your veterinarian arrives, he'll administer an antibiotic and tetanus booster (see "Guard Against Tetanus," page 69). He'll clean the wound if you haven't already and look for additional punctures. Then he'll palpate the area. If a metal item is believed to be in the puncture, he'll likely x-ray the site to determine its path.

Because an X ray won't detect a wooden or nonmetallic object, your veterinarian may anesthetize the area and inject contrast material into the track to outline the wound cavity and any remnants of foreign material.

## Beware

### Sources of punctures

- nails
- splinters from fence posts and trees
- thorns
- small stones
- barbed and loose wire
- fallen branches
- cornstalks
- frozen dirt clods
- T-post fences
- barn tools: rakes, pitchforks
- latches and hooks in the barn and trailer
- cattle with horns



### AN EYE TOWARD PREVENTION:

Periodically check your horse's surroundings to eliminate puncture risks, such as nails or screws protruding from fences (top). Also avoid using barbed wire.

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## Treatment

### Innovative oxygen therapy

At the Alamo Pintado Equine Medical Center in Los Olivos, California, horses with puncture wounds serious enough to require surgery may receive follow-up treatment in the facility's hyperbaric oxygen chamber. A cylinder large enough to hold two horses, the chamber is filled with oxygen at approximately two times normal atmospheric pressure. This is the same treatment used to depressurize scuba divers. A session takes approximately 90 minutes.

According to Carter Judy, DVM, Dip. ACVS, a veterinarian at Alamo Pintado, hyperbaric oxygen therapy (HBOT) has been used in human

medicine for more than a decade. In horses it is especially useful in treating closed infections in both the navicular joint and bursa. HBOT has been available at Alamo Pintado since April 2000.

HBOT does not replace antibiotics or anti-inflammatory medication. Rather, it enhances healing, says Judy. Anaerobic bacteria cannot survive in the oxygen-rich environment, which also bolsters the white blood cells' ability to defend the body from foreign organisms.

Because oxygen promotes blood flow, HBOT may help antibiotics reach the site of an infection—an advantage when treating abscesses.

The treatment regimen for a puncture wound depends on the injury's severity. In all cases, basic care includes cleaning the wound, removing damaged and dead tissue (debridement), and extracting any foreign material that remains. Your veterinarian also will establish drainage; in essence, he'll convert the puncture to a less dangerous laceration by widening the wound opening. With a foot puncture this means paring away part of the hoof. For body punctures, it means opening the wound until the outer section is as wide as the inside. The injury also will be wrapped to protect it from further infection, but care will be taken not to inhibit drainage.

A *superficial puncture* may require no more than basic care. Recovery normally occurs within days.

A *serious puncture*—one where the item has penetrated deeply into a sensitive area of the body—will require surgery. Depending on the na-

ture and extent of the injury as well as the available surgical equipment, the procedure may be conducted through an endoscope, minimizing additional trauma to the site. In cases where a leg, joint or foot is involved, a surgeon may aggressively flush fluids and antibiotics directly into the area; the procedure is called perfusion. This provides more protection than systemic administration of antibiotics. Aftercare may involve steadying the wound edges by immobilizing the site in a cast, brace or supportive bandage. Recovery may take as many as several weeks.

### In the aftermath

All puncture wounds—even those that are relatively minor—need to be monitored in the days and weeks after injury. Be on the lookout for swelling and tenderness in the area as well as pus. All are indicative of uncontrolled infection. Call your veterinarian immediately if you see any of these signs.

To facilitate healing, your veterinarian may recommend stall confinement, then, once your horse is on the mend, a few minutes of hand walking each day. Keeping his surroundings as clean as possible will minimize the risk of his wound becoming infected from the outside in.

Given the nature of horses, you can never eliminate all puncture wounds, but you can reduce their incidence. Regularly inspect the ground in areas your horse frequents for nails, glass shards, wood and metal splinters, loose wire and other potentially trouble-causing debris. Keep wood and wire fences in good repair; secure T posts to avoid accidents. Consider sweeping a magnet over the ground as you walk your paddock or corral to pick up stray bits of metal as well as nails after a farrier's visit.

When you are picking out your horse's hooves, take a few moments to inspect them for any telltale signs of a

puncture. And, if you spot one, make every effort to find the object that caused the injury.

**A**lthough a puncture wound may look benign, it rarely is. Without prompt and proper treatment, a seemingly innocent puncture can cause permanent damage and even endanger life. That's the problem with punctures. But knowing the risks that puncture wounds pose as well as what to do when your horse suffers one will help you and your veterinarian bring the situation quickly under control. 🐾

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