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Managing Chronic Infected Wounds in Horses

Chronic infected wounds are challenging for veterinarians to manage, not to mention distressing and costly for the horse owner. With the increase in multiple antibiotic resistance, treating these infected wounds isn't as cut-and-dried as it used to be. Today veterinarians can't just reach for the nearest antibiotic; they must consider the wound's entire ecology, the patient's immune health, and the pathogens involved.

At the 2015 American Association of Equine Practitioner's Convention, held Dec. 5-9 in Las Vegas, James Orsini, DVM, Dipl. ACVS, associate professor of surgery at the University of Pennsylvania School of Veterinary Medicine's New Bolton Center, described how veterinarians can tackle infected wounds with this in mind:

"Horses seem to find the dirtiest places to get injured, which results in contamination," Orsini began.

He said the most common modes of contamination include contact with fecal matter, particularly in stalled horses; sustaining a penetrating wound to the oral cavity, pharynx, esophagus, or upper airway, which have an extensive resident microflora population; and exposure to dirt, plant debris, and flies.

Treatment Steps
The first step, when faced with a contaminated wound, is to lavage it. "The solution to pollution is dilution," Orsini quipped. Your veterinarian should thoroughly but gently cleanse every part of the wound with a sterile saline solution.

If the wound is heavily contaminated or the tissue irreparably damaged, the veterinarian should also debride, or surgically remove, all compromised tissue. He suggested turning to medical maggot debridement when surgical debridement is difficult, such as with foot injuries, fistulous withers, and deep-tract wounds.

Drainage is remarkably important to wound healing. "As infection accumulates, it overwhelms the body's ability to clear," Orsini said. "This bacteria-laden, inflammatory exudate must have an egress for the immune system to effectively control the infection and orchestrate wound repair."

While gravity and implanted drains can encourage drainage, movement also helps. Controlled exercise, such as hand-walking and grazing, increases drainage and blood circulation, helps prevent gastrointestinal and musculoskeletal issues that can result from inactivity, and helps alleviate the stress associated with confinement and isolation.

"Good nursing care is critical for chronic wounds," Orsini added. "These horses are on stall confinement for weeks to months while the wound heals."

A new treatment method physicians use in human medicine that's gaining traction in veterinary practice is negative-pressure wound therapy. "This vacuum-assisted closure helps extract fluid from the wound, promotes wound closure, and improves circulation," he said.

Another important, but sometime overlooked, consideration when treating and handling these wounds is biosecurity. "We don't always think about the potential for human infection and vice versa, where we become the source of bacteria for these wounds," Orsini said. Anyone handling open wounds should wear gloves, wash hands before and after, and dispose of dressings properly.

Dealing with Bacterial Refugia
One of the reasons infected wounds become chronic or unresponsive to antibiotics is a phenomenon called bacterial refugia, which Orsini defined as "anything that's protecting the bacteria from the host's defenses, enabling the infection to persist."

These might include foreign bodies, surgical implants (e.g., orthopedic screws, plates and wires), devitalized tissues, or mucoid biofilms produced by the bacteria themselves. Biofilms are gel-like bacteria that form around a structure—it's what you clean from your teeth when you brush, said Orsini. While veterinarians can remove foreign bodies or surgical implants and debride tissues, these biofilms are a bit trickier to infiltrate. They are highly resistant to antibiotics and impervious to antiseptics, bleach, alcohol, and hydrogen peroxide, to name a few.

Orsini described a three-step approach to treating biofilm-infected wounds:

1. ***Physically degrade the biofilm*** The veterinarian should vigorously debride the wound to remove as much of the biofilm as possible and expose the bacteria to biocides (any agent that kills living organisms, specifically microorganisms). Orsini suggested using mildly abrasive gauze sponges, lavage, low-frequency ultrasound, and scalpels to debride the wound.
2. ***Prevent reformation of the biofilm*** "Immediately after debridement, the bacteria become susceptible to biocides again," said Orsini. At this point, the veterinarian should administer the appropriate topical and systemic antibiotic based on culture and sensitivity results. He suggested using topical silver sulfadiazine or a product that adheres to the wound, such as a gel, cream, or Manuka honey.

Repeat frequently Biofilms can reform in as **little as 24 hours, so Orsini advised repeating Steps 1 and 2 daily. "Frequent debridement reduces treatment duration and overall cost," he said. Reduce treatment intensity as the wound begins to heal.**
Treating the Immunocompromised Horse
Orsini reminded veterinarians that immunocompromised horses are less able to resolve bacterial infections. Factors that can alter a horse's immune system include:

- Age (think neonatal and very old horses);
- Antibody deficiency if foals suffer failure of passive transfer of maternal antibodies;
- Malnutrition;
- Physical or psychological stress, including training, transport, social isolation, hospitalization, etc;
- Diseases such as pituitary pars intermedia dysfunction (Cushing's disease);
- Corticosteroid administration; and
- Sepsis (blood infection).

Orsini suggested offering these horses supportive care such as clean, dry bedding; good barn ventilation; company to reduce the stress of social isolation; a quiet, restful, low-traffic area; and a good diet comprised of proteins, nutrients, and high-quality forage.

Treating the Horse With Poor Perfusion
Poor perfusion is another critical condition that limits the horse's natural defenses. "An effective immune response relies on the delivery of white blood cells, nutrients, and oxygen to the infection site," said Orsini. "Any circumstance that limits optimal blood flow to the site of infection inevitably limits the host's immune response, as well as its wound repair capabilities, which renders the wound vulnerable to infection."

Example of conditions tied to poor perfusion include:

- Sustained hypovolemia (low blood volume) or hypotension (low blood pressure), such as with endotoxemia;
- Thrombotic, or blood-clot-forming, states (e.g., vasculitis, or blood vessel wall inflammation);
- Extensive tissue trauma;
- Fibrosis (scarring);
- Impaded blood flow from a foreign body or implant;
- Pressure from an improperly applied bandage; and
- Severe edema (fluid swelling).

Orsini suggested treating inadequate blood flow by:

- Ensuring good hydration;
- Debriding traumatized tissue;
- Administering non-steroidal anti-inflammatories to treat vasculitis or edema;
- Encouraging movement;
- Applying compression bandages; and

Implementing oxygen therapy, such as hyperbaric oxygen.
Take-Home Message
Above all, when treating infected wounds, the veterinarian should identify the principal pathogen, determine antibiotic sensitivities, and achieve an effective antibiotic concentration at the infection site. Once the veterinarian gets a handle on your horse's infection, he or she can proceed with other wound-healing therapies such as sutures or skin grafting.