How to Manage Penetrating Injuries of Synovial Structures in the Field

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1. Introduction
Most lacerations and injuries penetrating synovial structures can be treated in the field without referral to a surgical facility, although referral is often preferable. Due to the potential serious consequences of such an injury, it must be treated as an emergency with immediate and aggressive treatment. When injuries are suspected to communicate with a synovial structure, referral should be presented as an option to the client. At this time, it should be established that if referral is a possibility, it must occur early in this process to give the horse the best prognosis for return to function, not after treatment has failed, to improve the horse on the farm.

Once the client has made a decision to have the horse treated at home, they must determine how much they are willing to spend. Discussion concerning finances is very important. The case you are about to start treating is likely to require at least 5 to 7 days of treatment, with potentially once-daily visits from either you or your colleague(s). Nonsurgical treatment on the farm can often approach the cost of nonsurgical treatment in a hospital. Is the client willing to provide the appropriate monitoring and care involved? The field veterinarian must also consider if they are capable of providing the appropriate diagnostics, monitoring, and care to this horse. The field veterinarian must also be able to determine when treatment should be pursued and when euthanasia is warranted.

The focus of this report is to outline an approach for the field veterinarian when referral is not an option. The diagnostics and treatment outlined can be performed outside of a surgical facility.

2. Pathogenesis
A traumatic puncture wound to the foot can occur when the horse steps on or strikes a metal foreign body (for example, roofing, street nail, or wire) or impacts wood or shale with sufficient force. A puncture wound to the central sole (frog and/or associated collateral sulci) can appear small and innocuous; in fact, many are shallow and result in nothing worse than a foot abscess. However, they are often deep and can have disastrous effects when synovial structures are entered. The foreign body is commonly contaminated with soil, rust, feces, and so forth, and serves as a delivery mechanism for bacteria, which can establish a serious infection. Depending on the trajectory of the foreign body and the depth of the wound, one or more of the following structures in the foot may be damaged: distal phalanx, distal sesamoid bone, distal interphalangeal...
joint, navicular bursa, deep digital flexor tendon, impar ligament, or the digital flexor tendon sheath.1–3

Lacerations or puncture wounds involving synovial structures are common injuries in horses and serve as the delivery mechanism for bacteria into synovial structures.4–7 Any wound that is in close proximity to a joint or tendon sheath should be treated as an emergency. Assume that the synovial structure has been invaded until proven otherwise.6 Acute lacerations or penetrating wounds (<6 to 8 hours) may result in bacterial invasion of the synovial structure without infection. However, chronic lacerations or penetrating wounds involving a joint/tendon sheath (>6 to 8 hours) often establish a true infection. The presence of bacteria within this space induces a synovial inflammatory response.4,5 Both inflammatory cells and mediators are attracted to this site to help eliminate the bacteria. This process alters the “normal” homeostasis in the synovial space and can result in an accumulation of fibrin, increase in synovial pressure, and so forth. As the duration of the inflammation becomes chronic, permanent damage can occur within the tendon sheath and/or joint, resulting in a life-threatening disease process or loss of use secondary to permanent lameness.1

3. Clinical Signs

A thorough physical examination of the horse, evaluating all systems, should be performed initially. Oftentimes, physical exam parameters are within acceptable limits. However, in the case of marked pain/lameness, the horse may demonstrate tachycardia and tachypnea. Systemic stabilization should be provided if excessive fluid loss has occurred (for example, sweating, bleeding). If the infection in the synovial structure is chronic or has become systemic, the horse will often have a fever. However, if previously treated with nonsteroidal anti-inflammatory drugs (NSAIDs), fever may not be present.

Inspection of the limb should start by observing the horse initially at the walk to determine the degree of lameness. Lameness associated with synovial structure injury can be quite variable and is dependant on the duration of infection, the pathogenicity of the invading bacteria, and whether the structure is open and draining (laceration) or closed (puncture/small wound).2,4,5 In the instance of a closed infected synovial structure, the infection is contained within that space. The resultant inflammatory response and increase in synovial fluid production leads to increased synovial fluid pressure and can cause a grade 4 to 5/5 lameness, based on the American Association of Equine Practitioners lameness grading system.8 In contrast, infected synovial structures that are open and draining may show minimal lameness on presentation. This can often result in a false sense of security regarding the extent of the laceration and the presence of infection. However, left untreated, lameness will rapidly progress as the wound begins to close.4,5

The wound must then be carefully and thoroughly examined both visually and digitally. Palpation can often reveal effusion of the joint, edema in perisynovial structures, cellulites, and regional soft tissue heat and/or pain.6,7,9

Horses that have sustained a penetrating injury to the foot are often moderately to severely lame on the injured limb, with the toe pointing or limb flexed with the dorsum of the hoof resting on the ground and limb non–weight-bearing. On physical examination, the corresponding hoof is usually warmer than the contralateral limb, with an increased digital pulse.1,3 Fever may or may not be present. If the foreign body has not been removed from the bottom of the foot before arrival, radiographs should be performed with the foreign body in situ to better assess the involved depth and direction.1–3 However, oftentimes an owner’s first response is to remove the penetrating object without marking the puncture site. If the owner calls before removing the penetrating object and is unable to wrap the limb in a manner to leave the object in place such that as the horse stands or moves in a stall (and it would not be driven in further), have them remove the foreign body. Because many people have cell phones with camera capabilities, they can also be instructed to take a photograph before removing the foreign material. In addition, the depth and direction of entry should be noted. However, if the owner is willing and able to bandage the foot, they can be instructed to bandage in a way that provides limb stability and allows the object to stay in place, for example, duct-taping a wooden block to the sole of the foot (away from the object) or cutting a hole in insulation foam so the object is not disturbed but the remainder of the sole is lifted off of the ground. It is imperative that they note the direction and depth of penetration as well as the site of puncture either on the sole or on a piece of paper because the location rapidly becomes unapparent. Warn the owner that after removal of the penetrating object, the wound may bleed profusely. Instruct them to have bandage material ready.

4. Diagnosis

Penetrating Injuries to the Sole of the Hoof

If the foreign body is not present on your examination, the foot must be thoroughly cleaned, pared out and/or trimmed, and examined for the entry wound. Hoof testers must be applied to all regions of the sole and frog. Pain elicited or fluid/bleeding produced with the hoof testers may help locate the puncture site. For ease of additional diagnostics, it is recommended that local anesthesia be performed via an abaxial nerve block to desensitize the foot.

If the foreign body is still present, at a minimum, two radiographic images taken at right angles to one another should be obtained to determine the spatial
relationship of the foreign body to various structures. The common images obtained are lateral and dorso-palmar/plantar projections.

Metal foreign bodies are easily visualized on radiographs; however, nonmetallic/organic objects such as wood may be unidentifiable. If the foreign body is no longer in the foot after properly paring and aseptically preparing the sole, a sterile metal probe/teat cannula may be inserted into the puncture tract and radiographs obtained to help determine the wound’s direction and depth. It is important to place the probe through the extent of the puncture tract gently so that healthy tissue is not damaged by creating a further extension of the penetrating wound. Once initial radiographs have been obtained, a fistulogram should be performed. Approximately 5 mL of sterile contrast media (such as iohexol) can be placed into the tract via a sterile teat cannula or catheter. Any excess contrast material should be wiped from the sole/hoof and at least two images obtained. The contrast media will show up on the radiographs and remain within the linear puncture tract if no synovial structures are involved or will be seen coursing into and lining the boundaries of the synovial structure affected. The disadvantage of injecting the contrast into the wound tract is that the solution is being injected into a possibly infected site (possibly seeding the infection deeper).

Deep penetrating wounds may reach the distal phalanx without affecting synovial structures. Septic pedal osteitis can result. This may not be evident in the early stages. However, over time, persistent lameness, drainage, and radiographic evidence of local lysis and loss of bone will become apparent.

5. Penetrating Injuries to Synovial Structures Not Within the Hoof

Wound Preparation
In general, for penetrating injuries to synovial structures that are not within the hoof, when synovial sepsis is suspected, the wound should be aseptically cleaned and prepared before sterile digital examination. This practice helps prevent additional contamination of the deeper structures of the wound. Sedation and local regional anesthesia can make the examination easier. The hair around the wound edges should be clipped after placement of sterile lube or sterile saline–soaked gauze placed in the wound. This minimizes additional hair and dirt debris contamination into the wound. Next, lavage the wound thoroughly with sterile saline. The lavage acts to not only reduce the foreign debris but also reduces bacterial numbers. It has been determined that to be most effective at removal of the bacteria, the lavage irrigation should be performed at a pressure between 8 and 15 psi. A pressure of approximately 8 psi can be applied using a 35-cc syringe and a 19-gauge needle. Alternatively, a 1-L bag of sterile fluids can be placed in a pressure bag, with the needle attached to the end of the fluid line, and directed at the wound. This process eliminates the need for repeated filling of the syringe. Additionally, a gentle lavage can be performed using a 1-L saline (0.9%) bottle and puncturing 4 to 5 holes in the cap with a 14- or 16-gauge needle. A dilute povidone-iodine solution can be prepared and used to lavage the wound. However, povidone-iodine is susceptible to inactivation by organic debris. This is important to consider because the infection-potentiating fractions found in both inorganic and organic debris (such as dirt, soil, etc) greatly increase the risk of infection. The infection-potentiating fractions specifically decrease the protective effects of white blood cells (WBCs), reduce humoral factors, and neutralize antibodies. Once the wound is thoroughly cleansed, sterile digital palpation can be performed. A sterile probe can be used as an alternative to a steriley gloved hand and may be preferred in small wounds to best evaluate the depth of the wound. With the probe in place, a full series of radiographs of the affected region can assist in determining the extent of the wound and likely tissue/synovial structure involvement.

6. Evaluation of Synovial Communication
A site distant from the wound in nontraumatized tissues should be aseptically prepared for synovio-centesis and synovial structure distention. For most joints, there are a number of different approaches available. For example, if the wound is laterally located, prep the medial approach to the synovial structure; if dorsally located, prep the palmar/plantar approach and vice versa. However, if there is swelling, cellulitis, suspected infection of the subcutaneous space, or circumferential trauma, synovio-centesis should be delayed until the cellulitis and so forth is resolved so as to not drag potential subcutaneous infection into a possibly noninfected structure. During this period of time, the synovial space should be treated as though it is infected. If an appropriate site can be identified, after aseptic preparation, a sample of the synovial fluid should be obtained and cytologic values measured. (Keep in mind that if the wound is visibly open and draining, it is likely that no synovial fluid sample will be obtained.) Synovial fluid can be collected in a purple-top tube for cytology and lactate and a red-top tube for culture and sensitivity. If there is a low volume of synovial fluid, shake out the ethylenediaminetetraacetic acid (EDTA) from the purple-top tube before addition of the sample. EDTA can falsely elevate total protein levels in a small sample size.

Sterile irrigation fluids (lactated ringer’s solution [LRS], saline – 0.9 should be infused under pressure using an IV extension set (30 inches) attached to the hub of the needle to help account for movement from the horse. During fluid distension, closely watch the wound site for any leakage of fluid. If no leak-
age at the wound is observed and fluid comes back out from the needle hub under pressure when dis-connected from the extension set, infuse antibiotics into the synovial space through the needle and then remove the needle. If leakage of fluid is observed (anywhere from a small droplet to a large trickle) from the wound site, communication between the wound and synovial space has been confirmed. If this is the case, continued through-and-through joint needle lavage can occur through the placement of multiple large-bore (14- to 16-gauge) needles in various locations circumferentially around the syno-vial structure before antibiotic infusion, needle removal, and bandaging.

7. Cytology
Cytologic examination of the synovial sample should be performed. The sample can quickly be assessed on the farm for total protein concentration by using a refractometer. Concentrations >3.5 mg/dL, where normal is considered <2.5 mg/dL, have been associated with a septic process.4,7,9 Protein levels >4.0 mg/dL have been correlated with sepsis and have greater sensitivity than total synovial white blood cell (WBC) counts.4,6 A WBC count >30,000 cells/μL is indicative of a septic process.4,7 However, it is important not to rule out a synovial infection, should the WBC count be less. Fibrin deposits within the synovial space can sequester the cells. One of the most consistent findings regarding the cytology analysis is a shift of >80% to 90% neutrophils, which can be toxic and degenerative.4,9 Simultaneous measurement of blood lactate concentra-tion and synovial fluid lactate concentration can help differentiate septic effusions from non-septic effusions. Sepsis (or a bacterial cause of the effusion) is noted when the synovial fluid lactate concentration is higher than the peripheral blood lactate concentration.1,2

If you obtained ample synovial fluid (>1 cc), a culture should be performed. Identification of the organism (s) and antimicrobial sensitivity are increased when the synovial fluid is placed into a blood culture medium. If the horse has been receiving antibiotics, there will be a decreased likelihood of a positive culture. Because of this, it is important to list the antibiotic that the horse has been receiving on the laboratory request form because they will weight the sensitivity results.9

8. Radiographs
Radiographs can reveal signs of osteitis or osteomyelitis (chronically), soft-tissue swelling, fractures of surrounding bone, joint pathology, loss of joint space, and occasionally an open synovial compartment. It is helpful to tape a small metallic radiographic marker to the skin at the wound site margins to help identify directly underlying anatomy. The presence of gas densities within the synovial space is an abnormal finding and suggests that air has entered the synovial structure. The presence of gas densities within the surrounding soft tissue space is indicative of an open wound or cellulitis. As with the hoof, positive contrast radiography can assist in determining if the synovial structure communicates with the wound if results of joint fluid distension are inconclusive. The contrast can be administered in two ways after aseptic preparation. It can either be injected into the wound or directly into the synovial structure from a distant site. The resulting fistulogram not only helps determine whether communication exists with the synovial structure but also indicates the depth and direction of the wound itself. After application of the contrast media, the hair and skin should be cleaned of any excess contrast material and a radiograph taken as soon as possible.4,6,7,9

Ultrasound examination can provide additional useful information, especially if performed before wound lavage, which can produce air artifacts, particularly for septic tenosynovitis within the digital flexor tendon sheath or carpal canal. The images can identify excess fluid, fibrin formation, and adhesions as well as assess tendon integrity.

With synovial structures, the key to success is early diagnosis. When the diagnosis is delayed for more than 24 hours, treatment is more challenging, and prognosis for return to previous activity level is decreased as the delay increases.7

9. Treatment
The ultimate goal is to eliminate the infection by using aggressive and early multi-modal treatment. This can be accomplished by systemic and regional antibiotic therapy, anti-inflammatory administration, synovial structure lavage, and primary/secondary wound care.

10. Antimicrobial Therapy
Broad-spectrum antimicrobial therapy should begin immediately. Thoughtful use is recommended and requires knowledge of the most common organisms responsible for the infection.4,9 The most common organisms identified in a synovial structure after introduction from a wound are likely to consist of Enterobacter spp, Streptococcus spp, Staphylococcus spp, Pseudomonas spp, and anaerobes.7,13 Antibiotic therapy will further be guided by culture and sensitivity results.

Intravenous antibiotics are recommended for the acute phase of the infection, due to their faster onset of action and maximized penetration into the synovial structure. Switching to oral antibiotics for at least 2 weeks is recommended after resolution of clinical signs. Selection of the specific treatment depends not only on its efficacy but also the safety for the animal and caretakers. Expense of the drug must also be considered, in addition to the ease of administration of the medication by the owners. Further, the advantages and disadvantages of intravenous antibiotics versus oral antibiotics must be weighed. You must evaluate the situation careful-
ly: Are the clients equipped to handle the care involved with an IV catheter? Are you equipped to visit the horse daily to monitor the catheter if needed? If not, can the clients administer an oral medication up to 4 times daily? Does administering an oral antibiotic, such as chloramphenicol, save a significant amount of money when compared with administering intravenous antibiotics? What oral antibiotic provides the best penetration into the synovial space and associated bone? Is it comparable to the intravenous antibiotics? Can regional limb perfusions be used instead of systemic antibiotics?

11. Nonsteroidal Anti-Inflammatory Drugs

Systemic analgesia is provided by NSAIDs. These drugs help reduce the inflammatory process and should be provided at the minimum dose necessary that keeps the patient comfortable. The analgesia and resulting anti-inflammatory effects provided outweigh the potential side effects of these drugs. The most commonly used NSAID is phenylbutazone (2.2 mg/kg) administered twice daily. Firocoxib (a highly selective COX-2 inhibitor) may also be used, especially in those patients who have a history of adverse side effects with the use of bute. Firocoxib has been reported to be as efficacious as phenylbutazone in horses with osteoarthritis. As clinical signs improve, the overall dose and frequency can be gradually decreased.

12. Curettage (for Penetrating Injuries to the Foot)

Although this is usually performed in the hospital setting under general anesthesia, this may be accomplished in the field if the horse is of good mind, proper sedation is used, and local anesthesia of the palmar/plantar digital nerves is performed. A distal limb tourniquet is recommended to maintain a visual field. If the puncture wound has been diagnosed to communicate with the coffin bone and radiographic images demonstrate septic osteitis, it is imperative to curette the infected bone (and only the soft, infected portion) because systemic antibiotics and regional limb perfusions alone are unlikely to penetrate this area due to lack of blood supply in dead/necrotic bone. Curettage can be accomplished by following the puncture wound tract to the distal phalanx. The approach through the wound located ventrally on the foot allows for drainage. A treatment plate can then be fit or a distal limb foot bandage can be placed. The benefit for electing to use a treatment plate is its ease for continued wound access and treatment. The plate should be maintained until the second-intention healing is occurring in the wound. The infected bone should be submitted for culture and sensitivity.

13. Joint Lavage

The decision to perform a lavage through needles or via arthroscopy/tenoscopy is often based on the duration of the infection and clinical signs. This can be performed every other day until the synovial fluid white cell count returns to within normal limits. The advantages of a through-and-through needle lavage are that it tends to be the easiest and least expensive method. Needle lavage is most appropriate for acute and less severe infections. Keep in mind, however, there are multiple disadvantages of the through-and-through needle lavage, such as inability to assess articular cartilage damage or perform a thorough lavage of the entire synovial space and inability to remove foreign debris and fibrin. Further, in chronic cases, accumulation of fibrin, thickened synovium, and multiple compartments in the joint can inhibit flow through the needle and result in potentially bypassing the infected area. Therefore, through-and-through lavage is not appropriate or successful in chronic and more severe infections.

A retrospective study has found that when horses were presented within 2 days after an open joint injury, the synovial structures were lavaged approximately 3 times, with a patient recovery rate of 87%. Case permitting, through-and-through lavage can be performed on the farm, either in the standing patient, using standing sedation and local anesthesia, or under triple-drip, using field anesthesia techniques.

A through-and-lavage is accomplished by using multiple 18-, 16-, or 14-gauge needles placed on opposing sides of the structure with rotation of the extension set for installation of fluid divided equally among needles, or, having two sets of fluids running through opposing needles can also work if there is enough assistance available. This author has also placed two 18-gauge, 3.5-inch spinal needles into the navicular bursa (in the hospital setting) when bursoscopy is not an option. A sterile balanced electrolyte solution is recommended for lavaging synovial structures (i.e., LRS, saline 0.9%). Use of antiseptic solutions has been documented to cause inflammatory changes and irritation in normal synovial structures. Antibiotics could be included in the lavage fluid; however, the time in contact with the synovium is transient in nature. Therefore, it is recommended to inject antibiotics directly into the joint/sheath after the lavage. Dexamethasone (DMSO) can be used in the lavage solution again; the time in contact with the synovium is transient in nature. This author routinely uses DMSO (1% to 10% solution). It has not been shown to cause significant irritation in septic synovial structures. However, research has shown that exposure may suppress equine articular cartilage metabolism in normal joints. The benefit associated with DMSO is a decrease in inflammation through both its superoxide radical–scavenging benefits and suppression of prostaglandins.

14. Intra-Synovial Antibiotics

Intra-synovial administration of antibiotics routinely follows the lavage. An advantage of intra-synovial administration is achieving concentrations...
greater than the minimum inhibitory concentration. When the antibiotic is delivered to the site of infection at concentrations greater than the minimum inhibitory concentration, resolution of the infection is improved. When available, the choice of antibiotics should be based on culture and sensitivity results. Gentamicin has been shown to cause minimal inflammation in normal joints at a dose of 150 mg per joint. When the author uses gentamicin, it is at a dose of 80 mg per joint. Amikacin has become a more favorable intra-synovial medication due to its similar but broader spectrum than gentamicin. The author uses amikacin at a dose of 500 mg/joint. The typical dose should not exceed the systemic dose with a frequency of administration every 24 to 48 hours. For infections that are not resolving, the author often will change to imipenim-cilastin at a dose of 500 mg/synovial structure.

15. Regional Limb Perfusion

This technique uses the vascular space to maximize perfusion of high antibiotic levels into not only the synovial space but also the surrounding soft tissues and bone. A sufficient volume of the antibiotic diluted in sterile water or a balanced electrolyte solution is infused, causing the vein to distend, resulting in diffusion of the antibiotic into the surrounding tissue. The dose of the antibiotic can be from one-third of a systemic dose up to 1 systemic dose diluted to a volume of 30 to 60 mL. In most cases, the total dose should not exceed 1 g, and less than this may be equally effective. Amikacin (0.5 to 1.0 g) is commonly used, but other concentration-dependent bactericidal antibiotics such as cefottour (1 g) can also be used.

When there is swelling, cellulites, or suspected infection of the subcutaneous space and intra-articular antibiotics are unable to be delivered, regional limb perfusion is recommended.

A combination of detomidine and butorphanol is often used to sedate the horse. The insertion site can be clipped and an aseptic scrub performed over the vessel to be catheterized, followed by application of a tourniquet. The tourniquet is placed proximal to the infected site. In the case of a carpus or hock, a tourniquet can be placed both proximal and distal to the infected synovial space. A small-gauge butterfly catheter (i.e., 23 gauge) is then placed in the vein, and the dilute antibiotic is infused over 3 to 5 minutes. A few 4 × 4 gauze pads can then be placed on the vein, applying pressure to the site as the butterfly catheter is removed. Vet wrap can then be used to secure the 4 × 4's in place, allowing continued application of pressure to the vein. The tourniquet should remain in place for at least 20 minutes to concentrate absorption of the antibiotic into the infected tissue (bone, soft tissue, synovial fluid), preventing systemic absorption. This is can be performed every 24 hours for 3 to 5 days, or as needed.

Regional limb perfusion can also be used as the only delivery route for antibiotic administration in horses with septic synovial spaces and achieve resolution of the infection. This is advantageous because it can reduce the cost associated with treatment as well as reduce systemic toxic effects of the antibiotic used.

16. Response to Treatment

After initial assessment, diagnosis, and treatment, daily assessment with continued treatment and management are essential.

Lavage and local delivery of antibiotics (intra-articular and regional limb perfusion) should continue until synovial fluid cytology returns to within normal limits, indicating there is resolution of the infection. A single lavage may clear the infection; however, it is more common that several lavages and delivery of local antibiotics are indicated. The best way to assess the clinical response of a patient is to closely monitor the way in which the horse uses the injured limb. Are they bearing weight evenly while standing? Are they gradually improving in weight-bearing as they walk? Is the lameness improving? If clinical improvement occurs in conjunction with improvement of the synovial fluid cytology, joint lavage and local delivery of antibiotics can be discontinued. Intravenous antibiotics should be continued for at least 5 to 7 days (or until synovial infection resolves), followed by a course of oral antibiotics for at least 2 weeks.

17. Exercise

Exercise should be restricted to stall rest until the elimination of infection. After this time, the horse should remain on stall rest with some passive range-of-motion exercises and walking exercises. Walking exercise should begin as soon as the horse is comfortable enough to walk forward willingly. A gradual increase in exercise should then take place. The duration of exercise progression will depend on the severity of the injury.

18. Prognosis

The survival rate and return to work is improved for horses with septic arthritis as the result of enhanced diagnostic techniques and early treatment. The specific joint involved has not been observed to have a significant effect on prognosis. However, tendon sheaths have been reported to have a better prognosis for survival than joints, where cartilage damage can occur. Despite the better prognosis for survival for septic tenosynovitis, development of adhesions and fibrosis in the sheath can inhibit a return to soundness.

The prognosis is generally guarded for puncture wounds to the sole that affect a synovial structure. Infection of the navicular bursa often leads to serious sequelae, causing this to be the most frequent reason for euthanasia involving puncture wounds to the foot due to the close nature and often concur-
ently affected deep digital flexor tendon and navicular bone. However, if the navicular bursa that is infected is in the hind limb, a more favorable prognosis for athletic activity and survival can be given if it receives surgical treatment within 1 week after injury.3

Prognosis for septic pedal osteitis for return to previous activity is good if the deep digital flexor tendon and other synovial structures of the hoof have not been affected.7

19. Summary
Penetrating injuries of synovial structures are serious emergencies and can result in career-ending or life-threatening lameness. Immediate, thorough evaluation and aggressive treatment are necessary to give these horses an opportunity to resume their previous level of activity. Although referral is the best choice for optimum care, treatment of these cases in the field is both possible and often successful.

Despite the improved techniques, a successful outcome cannot be obtained in every horse. Due to penetration of infection into bone or irreversible damage to articular cartilage, some joint infections will be difficult to eliminate. Further, laminitis of the supporting limb is a risk, which complicates treatment. For owners with horses that have chronic, severe/refractory infection and where referral is not an option, the horse is often unable to achieve an acceptable quality of life. Again, the field veterinarian must be able to determine when treatment should be pursued and when euthanasia is warranted.

References