



# Orthopedics and Wound Care

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## Kissing Spines: Common, But Not Career-Ending

Kissing, while generally considered favorable in its usual context, isn't always so great when it comes to horses' vertebral surfaces. Overriding spinous processes—known as kissing spines—can cause severe back pain, said Tracy Turner, DVM, MS, Dipl. ACVS, of Anoka Equine Veterinary Services, in Elk River, Minn., but not all horses with the condition have complications because of it. Turner described a study in which he determined kissing spines are more likely to cause clinical problems in certain breeds, disciplines, and ages, and that a particular combination of therapies can produce successful outcomes.

Of 4,407 horses Turner saw for lameness, 7% of the cases, or 310 horses, displayed back pain. He conducted a complete lameness exam, including thermography and radiography, on each of these horses to rule out other potential pain causes. This narrowed the group to 212 horses (68% of the back pain horses) with kissing spines.

Among horses with back pain and kissing spines; back pain and no kissing spines; and a control group, Turner discovered:

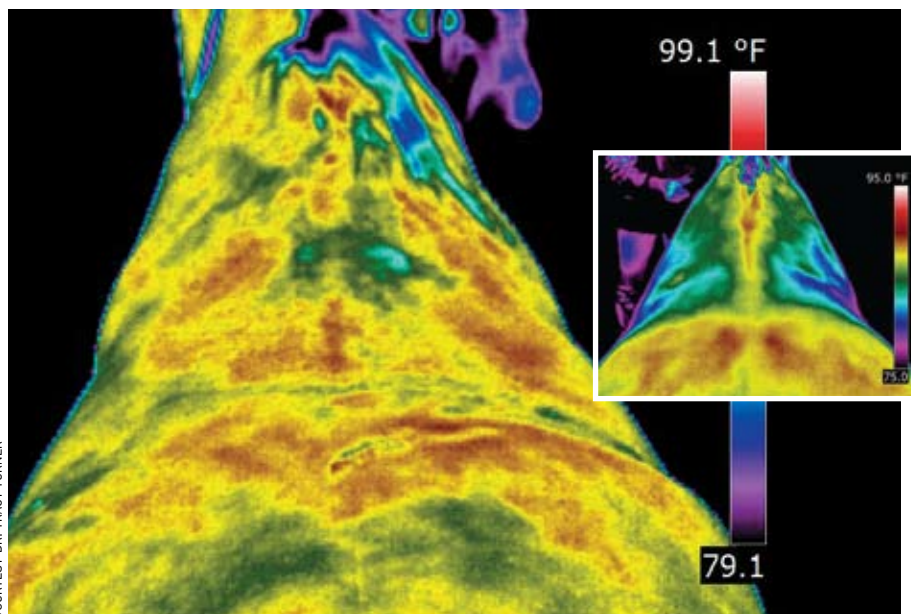
- Kissing spines make a horse three times more likely to have back pain.

Also, horses with pain/kissing spines:

- Most commonly were Thoroughbreds, Thoroughbred crosses, Quarter Horse types, and Warmbloods;
- Were 6 to 10 years old; and
- Forty percent were dressage horses (notably, 23% of horses with back pain/no kissing spines were dressage horses).

He noted that 27 (39%) of control horses had kissing spines; of seven Thoroughbreds in that group, six had the condition.

Painful horses' ground behavior ranged from hypersensitivity when brushed to girthiness when saddled. When ridden, horses bucked, reared, kicked out, and displayed rear limb dragging, head tossing, and excessive shying. Riders complained horses were hard to get on the bit,



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Thermography is a very useful method for detecting where pathology might be in horses with kissing spines, such as in the affected horse above. A scan of a normal horse is shown in the inset.

hollow, behind the leg, slow to warm up, stiffer one direction, and exhibited poor transitions.

"Dressage horses were distinctly over-represented," he observed. "Dressage is one-third of eventing, so over 50% of horses with kissing spines (in this study) are in some kind of dressage."

So, why dressage horses? "There are a lot of arguments ... the horse is asked to engage its hind end, the rider does more sitting, and the horse is compressed more," Turner opined. Also, "Dressage riders are so attuned to how that horse moves (so it may be that) they complain sooner."

Treatments Turner employed included shock wave therapy, mesotherapy (multiple intradermal injections made over the back, croup, and withers), corticosteroid injections, saddle fitting changes, and exercise. He assessed outcomes using owner and veterinarian evaluations, finding:

- Horses reached "good" to "excellent" in 86% of the cases with a combination of shock wave, mesotherapy, and exercise;
- Sixty-three percent reached good to

excellent with mesotherapy alone, and 59% with corticosteroid therapy alone;

- "Horses respond very markedly with age," said Turner, who reported that only two horses less than 5 years improved. There were four "absolute failures" in the same age group ;

- Owners refitted saddles for 29 horses; in 13 (45%) the refit helped. Eleven of these (85%) were dressage horses.

Turner concluded by describing kissing spines as a developmental condition. "I think genes cause it. It does not cause lameness but it does predispose (a horse) to lameness. Thoroughbreds are predisposed. After looking at all the data, kissing spines must go with speed or some other trait that we've bred the Thoroughbred for."

A horse with back pain needs to be worked and trained to lift up his back as a part of recovery, he explained. And, importantly, veterinarians should employ a combination of medical treatment and other approaches to address kissing spine-related pain. For more results from this study see [TheHorse.com/19457](http://TheHorse.com/19457).



## Evaluating Feet, Legs, and Gaits

Ric Redden, DVM, founder of the International Equine Podiatry Center in Versailles, Ky., explained his methods for evaluating equine foot flight and limb alignment. "This approach is beneficial for assessing horses of any age, from diagnosing limb deformities in foals to identifying potential high-risk factors in prepurchase exams of adult individuals," he said. "This methodical protocol allows us to better understand variations in distance and structural angles that fall within the range of normal, as well as alterations that are not compatible with soundness. Using a systematic, methodical approach for every exam offers a useful means of enhancing our ability to record small details that may otherwise be overlooked."

Typically Redden begins his exam by watching a horse walk away from him and toward him repeatedly, as well as assessing the standing horse. He envisions imaginary dots on each joint and a few other locations to evaluate joint and limb alignment. When viewing the horse from the front, Redden said to assign imaginary dots in the following seven places:

1. Center of toe.
2. Center of coronary band.
3. Center of fetlock.
4. Center of the proximal (upper) cannon (note this dot will be superimposed over Dot 5 unless axial deformity is present).
5. Center of the most distal (lower) aspect of the carpus (knee).
6. Center of the distal radius (the bone above the knee) at the level of the physal (growth) plate.
7. Most proximal point on the forearm. A small swirl of hair is normally located at the top and centerline of the radius.

While observing the dots, visualize imaginary lines between them and note any deviations of the lines, he instructed.

"Have the handler keep the horse's nose as straight as possible because the digits follow the nose," he said. "Astute handlers can hide a lot by where they put the nose when the horse is moving. When observing foals, having someone walk the mare along a wall or fence offers a reasonable means of assessing the foal as he travels ... focus on foot flight and the landing phase.

"Also, watch the air space under the foot; if you have a shadow, look at its shape before the foot lands (asymmetry shows the



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Imagining a laser passing squarely through each dot (visualized above) helps determine which way the joints bones are facing; this practice can help identify straightness deviations between major joints.

foot isn't landing flat)," he added.

"Next, imagine an imaginary laser or arrow centered on each dot, passing squarely through it on the sagittal plane (to show which way joints/bones are facing)," he went on. "Observing these imaginary lines is a reliable, consistent method for identifying planes of deviation that can and often do occur between major joints. Using the dot system and observing the sagittal plane helps train the eye for details that may otherwise be missed."

He described several limb deformities, implications, and treatment principles:

- Angular (valgus/varus; the lower limb deviates outward or inward as you go down the leg);
- Axial (inward/outward shift of knee/hock joint surface, such as an offset knee);
- Rotational (outward generally forelimb rotation, beginning in the shoulder); and
- Spiral (inward twist of the cannon bone; results in an inwardly rotated lower carpus and a toed-in fetlock, pastern, and hoof appearance).

"We must always be mindful of the natural range of anatomical features that is responsible for overall limb conformation, foot flight, and land/load patterns, as

well as the limits of the healthy range," he concluded. "Many foals have multifaceted deformities; some are compatible with future soundness, while others are not."

## Cast Complications in Horses

Problems requiring a cast are significant, and the challenges don't stop there; researchers on a recent study found that nearly half (49.5%) of horses with limb casts experience complications (such as pressure sores or cast breakage).

John Janicek, DVM, MS, Dipl. ACVS, of the Weems and Stephens Equine Hospital, in Aubrey, Texas, presented a recent review of complications in horses wearing half- or full-limb casts at four referral centers. Scientists included 398 horses in the study and made the following observations:

- Hind limbs were more frequently casted than front limbs;
- Soft tissue problems (severe wounds/tendon problems) were casted slightly more often than hard tissue problems (such as fractures);
- Complications included cast sores (45% of all casted horses), cast breakage (5%), secondary fracture (0.7%), and others. Complications generally showed up within two weeks of application regardless of the cast type, with cast breakages usually occurring within five days;
- Bandage casts were less common than traditional fiberglass tape casts (13.3% vs. 86.6%), but they exhibited a notably lower complication rate (34% vs. 52%);
- Of limbs casted in a flexed position (such as to reduce tension on ligament/tendon injuries on the back of the leg) 71% developed complications, compared to 48% and 47% of limbs casted in neutral or extended positions, respectively; and
- Institution also had a significant effect on complication rate, meaning some referral centers recorded more cast complications than others.

"Subjectively, we have always known which cases would most likely develop a cast complication, but never had a firm grasp on the overall number of horses that encounter this problem," Janicek explained. "Now we have objective information in regards to limb casting we can pass along to our client.

"Fifty percent of all equine patients requiring casts will develop some kind of complication; this was very surprising to me," he remarked. And, "77% of horses





that develop cast complications will display clinical signs (i.e., lameness)."

Janicek concluded by noting that "the consequences of not utilizing a cast in cases requiring external rigid stabilization far outweigh the risks we encounter with cast application in horses; the most common cast complication recorded in this study is easy to address and will typically heal without any long-term effects."

### Benefits of Bandage Casts for Severe Limb Injuries

While casts play an important role in stabilizing fractures and treating wounds and tendon lacerations, they can cause a variety of complications. Some horses don't tolerate casts well, casts can cause pressure sores, and many veterinarians prefer to hospitalize horses with casts—an expensive endeavor for many owners.

Ashlee Watts, DVM, Dipl. ACVS, of the Department of Clinical Sciences at Cornell University's College of Veterinary Medicine, described a bivalved bandage cast (that can be removed by two equal cuts on the inside and outside of the limb) technique for applying and reapplying a standing bandage cast to horses with severe lower limb injuries.

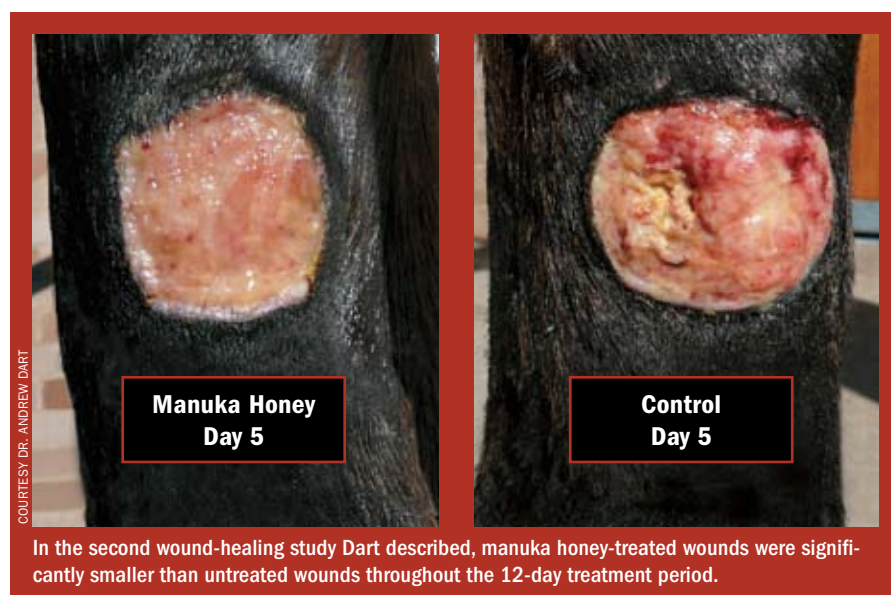
Key points regarding bivalved bandage casts include:

- Standard casts, without an underlying bandage, are challenging to apply in the standing patient; can lead to rub sore development; and cannot be removed and reapplied without making a new cast.
- A bandage cast can be applied to a standing patient, causes rub sores to develop more slowly, and can be managed outside of a hospital setting.
- A veterinarian can remove the underlying bandage for wound care and reapply the cast shell over a new bandage; and
- The bandage cast can accommodate changes in limb swelling while maintaining some rigidity.

Watts said owners and veterinarians should consider using this cast to treat horses with open joint lacerations, luxations (dislocations), injuries in high motion areas such as the front of the fetlock, and tendon and ligament injuries.

### Manuka Honey for Healing Wounds

Some vendors claim that manuka honey, made by bees visiting the manuka bush found exclusively in New Zealand, has



humans and in experimental animals.

But can it help horse wounds heal faster than they would if left untreated? Researchers at the University of Sydney's Veterinary Science Research and Clinical Training Unit decided to find out. Andrew Dart, BVSc, PhD, Dipl. ACVS, ECVS, described two controlled studies in which he and colleagues used manuka honey on horse wounds. One evaluated UMF (Unique Manuka Factor) 20 manuka honey, while the second compared a 66% manuka honey and water gel to 100% manuka honey for wound healing.

"Honey has been used on wounds for many years ... because its high sugar content and osmolarity draw water out of wounds and reduce edema (fluid swelling)," Dart said. "It also pulls water out of bacterial cells and helps kill them and has a low pH (slightly acidic)."

The honey's antibacterial activity works via the methylglyoxal compound, which affects bacterial RNA and protein synthesis, he explained. It also has immune-modulating properties, say proponents.

In the first study, investigators contaminated wounds with feces for 24 hours in an attempt to recreate typical scenarios where limb wounds might be contaminated for some time before owners discover them. Wound retraction (expansion of wound edges) and proud flesh development are often observed with such wounds, noted Dart.

After 24 hours researchers treated half the wounds with manuka honey (the

other half was left as an untreated control group). The wounds were bandaged and treated daily for 12 days. Dart reported that manuka honey-treated wounds were slightly smaller than control wounds at Day 5 and significantly smaller from Day 7 until Day 35. There was no significant effect on the overall time to wound healing compared to untreated control wounds.

In the second study Dart and his colleagues evaluated the more user-friendly 66% manuka honey water-based gel, which could be used on the wounds without a bandage. Pure manuka honey is liquid at room temperature, explained Dart, so it doesn't keep contact with the wound for long without a bandage.

"We hypothesized that the gel would be as effective as pure manuka honey and that a longer treatment time would shorten overall time to wound healing," he said. "We also thought there would be a greater effect on contaminated wounds."

Researchers treated contaminated and uncontaminated wounds with pure manuka honey or the gel for 12 days, with the manuka honey gel until healed, with a plain gel for 12 days, or not at all. Dart noted there were variations in the wound healing patterns between contaminated and uncontaminated wounds; however, treatment with manuka honey had no positive interaction with contaminated wounds.

"All three manuka honey treatments were very similar," Dart recalled. "Manuka honey gel-treated wounds healed fastest at 47 days." In comparison, pure manuka



honey-treated wounds healed in 52 days, while plain gel and control wounds took 64 days to heal.

"As a gel, manuka honey can be used safely to promote healing of equine wounds without the need for a bandage, thereby reducing complications and costs associated with long-term bandaging," he summarized.

### **Skin Grafting Technique Helps Injured Horses Heal Better**

When our horses sustain traumatic wounds, we do everything we can to ensure quick recoveries. That can include skin grafting, according to a practitioner who described a practical "pinch grafting" technique that he said can help wounds heal faster.

"Horses have very little extra skin in the lower limb so when a horse is traumatically injured and large amounts of tissue are lost, it is often impossible to suture the wound closed," said Richard Hackett, DVM, MS, Dipl. ACVS, from Cornell University's College of Veterinary Medicine. "The wound must heal on its own by second intention healing," whereby the horse's body lays down a bed of scar (granulation) tissue before skin cells migrate over it from the wound's edges.

"Second intention healing is notoriously slow and can result in an unsightly, weak scar," relayed Hackett. "The main goal of skin grafting is to accelerate healing and reduce the time an injured horse is under veterinary care. Secondary goals are to improve the cosmetic appearance and durability of the healed wound."

There are a number of effective grafting techniques, but one a veterinarian can perform easily in the field is called pinch grafting. This involves obtaining several small pinches of skin (e.g., from under the mane) using a scalpel blade before placing these "donor" grafts in small scalpel-induced "stab wounds" in the wound bed.

Regarding this method, Hackett noted:

- Only consider grafting once wound contraction (when the edges contract and the wound bed shrinks) is complete;
- The granulation bed must be flush with adjacent skin and free of infection;
- Put horses on systemic penicillin, gentamicin, and an NSAID before surgery and continue administering these for five to seven days after surgery;
- Donor sites do not need to be sutured;



Pinch grafting involves placing small pinches of skin (seen here as dots) in the wound bed.

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- Applying local anesthetic to the wound bed is not necessary as the granulation tissue has no nerve supply;
- Do not worry about aligning the grafts in the direction of hair growth, as hair growth after grafting is sparse;
- Post-grafting, rebandage the affected area every two to three days. Three weeks later, surviving grafts should have an obvious ring of new skin growth; and
- If many grafts die, regrafting might be necessary.

Hackett concluded, "Pinch grafting is the easiest grafting technique in horses, requires no specialized equipment, and has a similar rate of positive outcomes as other, more advanced grafting techniques."

### **Delayed Suturing for Lower Limb Wounds**

Just as "there's more than one way to skin a cat," there's more than one way to repair a horse's wound, particularly on the lower limb. And while many of us might be under the impression that all horse wounds should be stitched closed as soon as possible, this is not always an option. Hackett described what to do in these cases.

"If there is a high chance that an infection will develop if the wound is sutured closed, due to the presence of foreign material, for example, or if the wound is older and wasn't presented to the veterinarian early enough to suture, then a technique

called 'delayed wound closure' could be used," Hackett explained.

This method—which involves suturing wounds closed four to five days after injury (any sooner than that is considered primary closure)—is helped by the following approaches:

- When cleaning the wound upon discovery, debride the surface of the entire wound to eliminate bacteria, particulate foreign material, and severely damaged tissue and wash the wound with saline under low pressure;
- Use concurrent therapies such as regional limb perfusion with antibiotics, systemic (intravenous or intramuscular) antibiotics and non-steroidal anti-inflammatory drugs, and tetanus prophylaxis (shot) if appropriate;
- Four to five days after injury apply tension-relieving sutures, followed by standard simple interrupted sutures to minimize the tension on the wound edges and avoid dehiscence (bursting open of the wound); and
- Cover the wound with a heavy pressure bandage or even a cast if the wound is in a high-motion area (e.g., heel bulbs, the front of the fetlock) or involves the flexor tendons.

"Only attempt delayed closure if the wound has little or no tissue loss and the tissues appear healthy with minimal swelling and only small amounts of non-odorous serous (clear) discharge," warned Hackett.

If a wound does not meet these standards, then it should heal on its own via second intention healing. In these cases be sure to watch out for development of excessive granulation tissue, which is also known as proud flesh.

### **Granulation Tissue Management**

When it comes to healing lower leg wounds, some horses' bodies essentially "overheat" their injuries, resulting in the production of unsightly granulation tissue. Hackett discussed how to prevent exuberant granulation tissue (EGT) development.

Because horses have little extra skin in the lower limbs, injuries to this area often need to heal by a process called second intention healing. "Granulation tissue needs to fill in the defect and cover tendons, ligaments, bone, and other important structures before new skin cells can migrate



over top of the scar tissue to repair the wound," he explained. "Granulation therefore produces much-needed healing tissue, but in some horses the process continues unabated and too much granulation tissue is produced."

In these horses the skin cells aren't able to migrate over top of the scar tissue to ultimately heal the wound. The result is a large, unsightly ball of tissue on the limb.

Hackett relayed several important facts about granulation tissue production, along with ways to prevent and manage it:

- It occurs more frequently in draft and other large breeds;
- Lower limb wounds—especially in high-motion areas that cannot be sutured—are more likely to develop EGT;
- Wrapping wounds with a commercially available silicone gel dressing can help reduce the likelihood that the granulation tissue will become exuberant;
- Any EGT protruding above the adjacent skin must be removed;
- Open wounds can become neoplastic (cancerous), so biopsies might be indicated; and
- Tissue grafting can be performed after the wound has finished contracting to help skin cells migrate over the scar



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Granulation tissue often forms on lower limb wounds where there's little extra skin for healing. Careful management can help prevent exuberant granulation tissue (seen here) from developing.

tissue bed to achieve complete healing.

When faced with wounds that have the potential to develop EGT, Hackett recommended horse owners minimize exercise for the animal, keep the wound clean and covered with a bandage and silicone dressing, and contact a veterinarian if tissue begins to protrude above skin level.

### **Regional Limb Perfusion to Treat Distal Limb Injuries**

In light of horses' propensity for lower limb injury, the environment in which they live, and the difficulty and expense associated with treating severe lower limb injuries, many equine practitioners have turned to regional limb perfusion (RLP), noted Watts in the other presentation she gave during the wounds/orthopedics session.

This process involves intravenous antibiotic delivery via a vein that supplies blood to the lower limb by isolating it with a tourniquet. "RLP is popular because it can provide higher concentrations of antibiotics to the site of injury, including joints, with lower doses of antibiotics than need to be administered via the jugular vein or intramuscularly," said Watts.

Additional benefits include ease and speed of the technique, the use of standard equipment, the procedure's minimal invasiveness and lack of major resulting complications, and minimal patient resistance.

To ensure successful RLP in the field:

- The procedure is indicated for distal limb musculoskeletal conditions where infection is or might be a problem;
- The technique can be used as a stand-alone therapy but usually is performed in conjunction with systemic antibiotic administration, wound lavage, topical therapy, and surgical intervention;
- The area around the vein needs to be shaved and aseptically prepared to minimize local inflammation. The vein can be increasingly difficult to puncture if daily RLP is required for several days, presumably due to local inflammation. Applying the topical NSAID Surpass (1% diclofenac sodium) might minimize inflammation and prolong the period that RLP can be performed.
- Veterinarians most often perform RLP in standing, heavily sedated horses, as the horse must remain as still as possible for maximal drug delivery; and

- RLP takes approximately 40 minutes to perform.

"In cases of severe trauma, daily RLP has the potential to improve prognoses, reduce costs, shorten recovery times, and turn previously hopeless cases into cases with positive outcomes," said Watts.

### **Standing Surgery Safe for Horses with Lower Limb Injuries/Infection**

In addition to the standing/heavily sedated approach Watts described, regional limb perfusion can also be performed while the horse is "sleeping" under general anesthesia. Recently, a group of researchers in South Africa tried to determine which is best, and Arnold T. Mahne, BVSc, of the University of Pretoria, in Onderstepoort, presented the results.

Mahne described the study in which he and colleagues conducted RLP in horses that were either under general anesthesia or remained standing, measuring both discomfort caused by the procedure and efficacy.

To determine which technique was the most comfortable for and effective in horses, Mahne and colleagues assessed pain and measured amikacin (antibiotic) levels in the knee joint during the procedure. Horses were divided into four groups: general anesthesia (GA); standing sedation alone; standing sedation plus nerve block; and standing sedation plus intravenous (IV) anesthesia. The researchers found:

- No significant difference in amikacin levels among groups. All treatments resulted in therapeutic levels of amikacin.
- Horses were more comfortable in the standing sedation plus nerve block group than in the standing sedation and standing sedation plus IV anesthesia groups.

Putting a horse under general anesthesia is expensive and can be a risky procedure due to, among other factors, the stress it puts on the animal.

"Based on this study GA for intravenous regional limb perfusion is not justified as this procedure can safely, effectively, and comfortably be performed (with the horse) standing, particularly when done with a nerve block," said Mahne. 🐾

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- Supporting Limb Laminitis in Casted Horses: A Review





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