



THE TIES THAT BIND

By Steve Fisch, DVM

Tendon and ligament injuries are a significant source of lameness in performance horses, barrel horses and racing Quarter Horses. They can result in a major source of economic loss in terms of training days, veterinary bills and time spent treating the injury, not to mention lost performance time. Injuries to tendons and ligaments can quickly end an equine athlete's career. Both tendons and ligaments have great stresses applied to them, whether it's a racehorse running full steam at 55 mph with the horse's entire weight on one leg at certain phases of the stride, or a barrel horse maneuvering with quick speed and repetitive motion through the cloverleaf pattern.

The softer and more yielding the racing or performing surface, the more stress is put on the tendons and ligaments, while harder, firmer surfaces put more stress on joints and bones. Therefore, a balance must be found. Barrel horses and racing Quarter Horses perform on many types of surfaces around the country. Some tracks and arenas

Tendons and ligaments are the connections that hold bones in place and allow the muscles to create propulsion either forward, backward, up, down or sideways. Both tendons and ligaments are made of collagen fibers arranged lengthwise so they are capable of stretching. Collagen is a tough protein substance found in skin, tendons, ligaments, cartilage, bone and other connective tissues. It allows tendons and ligaments to stretch and gives them their strength. Tendons and ligaments are similar in structure, but tendons are generally more flexible and have more stretching capability. Tendons connect muscle to bone, while ligaments connect bone to bone.

have surfaces that are far too hard. These surfaces may result in very fast speeds, but those extremely hard surfaces probably also result in an over representation of bone and joint injuries. Breaking from the chute or starting gate, or racing and running on loose or sandy surfaces can cause problems because of the need for traction while operating at the speeds necessary to win. Loose footing lends itself to causing forelimb flexor tendon injuries along with muscle strains, back soreness and suspensory ligament injuries. Arena surfaces are safer when the proper balance has been found. It may seem safer for a barrel horse to compete in a deeper arena, but my opinion is the looser footing can cause the horse to stretch and tear tendons and ligaments as he fights for traction or attempts to bring it home with a burst of speed after the last barrel.

In addition to providing the proper surfaces for the equine athlete to perform on, prevention of tendon and ligament injuries begins at birth. It is very important for foals to have room to run and play in the pasture as they mature. Horses allowed to exercise freely as young, maturing horses tend to develop potentially stronger tendons and

ligaments. The response of the body to the strength that is required to jump from side to side and race his friends as he grows up goes a long way toward preventing future injuries. This is a good reason to know where and how the horses you purchase as young prospects were raised. All other factors being equal, a yearling raised in a pasture with other weanlings and yearlings to play with will develop stronger ligaments and tendons.

Prevention also includes a proper fitness and training program. Depending on the athlete's job, the tendons and ligaments respond to training much like bones do. As long as they see the maximum amount of stress that would normally be applied during a competition for a brief period of time, the tendons and ligaments respond by increasing in tensile strength in a manner that will make them better able to handle the stress of competition. The athlete's tendons and ligaments don't have to see this amount of stress several times a week. A good training regimen allows for a brief period of near

maximum output on a periodic basis while allowing ample time for recovery and repair.

Signs of trouble

Many signs of tendon and ligament injury are obvious, such as heat, swelling and lameness. However, some injuries, such as a suspensory ligament injury, may show no obvious sign of swelling or heat. The only sign may be a decrease in performance. Racehorses may not break from the gate as well with a rear leg suspensory ligament desmitis. Western pleasure horses may not be able to keep the proper cadence, without exhibiting any other clinical signs. A thorough physical exam with palpation and watching the horse move out of his stall along with watching him walk, jog or trot is in order.

Tendon and ligament injuries can also be diagnosed with ultrasound. Lesions appear on ultrasound as a loss of echogenicity, meaning the sound waves don't bounce back. Sound waves bounce back from intact fibers, but not from fluid. The space where fibers are torn is filled with fluid. The larger

the tear, the more fluid will fill the defect and the greater degree of hypoechogenicity, which results in an image with some degree of a "black hole." The larger the black hole, the worse the prognosis and usually the longer the layoff before returning to work. Alternatively, some injuries will appear as a thickening of the ligament or tendon and will appear hyperechoic. A more accurate diagnosis will be made if all the edema and inflammatory fluid is removed from the area to be ultrasounded. If the injury is ultrasounded immediately post injury, it may appear worse than it actually is as the edematous fluid surrounding the injury can appear as a lesion in the tendon or ligament. Therefore, the initial treatment protocol in an injury with obvious swelling and heat is also important in the diagnosis and prognosis. Immediate anti-inflammatory therapy including nonsteroidal anti-inflammatory drugs (NSAIDs), cold therapy and support wraps will reduce the inflammatory fluid in the area of injury and thereby allow for a more accurate ultrasonographic diagnosis.



After the physical exam is completed and the location of the lameness has been determined by careful observation and palpation of the affected limb, an ultrasound exam can help pinpoint the cause of the lameness.



Proper leg wrapping can aid in the removal of excess fluid around the tendon and ligaments. Removing all the excess fluid in the area of the lesion allows for a more accurate diagnosis and prognosis. Improper wrapping can be another cause of tendon damage.

The ultrasound diagnosis ranges from type 1 through 4. Type 1 includes a tendon or ligament enlargement with only minimal fiber pattern disruption and minor inflammatory fluid infiltration. Type 2 lesions have 50 percent or less of the area represented as anechoic, or dark with fluid. Type 3 lesions show more than 50 percent of the cross section area of the tendon or ligament as anechoic. Type 4 lesions have the worst prognosis by far and are totally anechoic. The black areas in type 4 lesions indicate almost total fiber tearing. MRI is an alternative to ultrasound for diagnosis, but the cost and fact that in most cases the patient has to be under general anesthesia for the procedure to be performed make MRI an unlikely first choice for diagnosis.

Time to heal

Tendons and ligaments heal more slowly than any other structural part of the body. Therefore, a tendon or ligament injury may require several months to a year or more of treatment and rehabilitation.

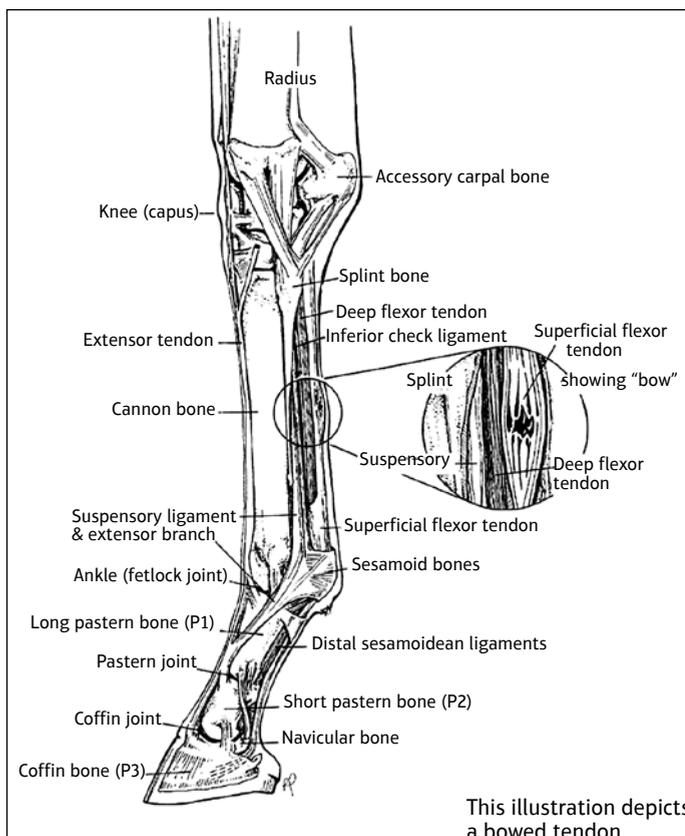
Treatment for these injuries always starts with therapy aimed at reducing inflammation. If lameness and swelling last more than a few days, it's time to have the tendon or ligament evaluated by a veterinarian. Even if the swelling and lameness has subsided in a few days, the injury should still be examined by ultrasound to evaluate the extent of the damage. Many times, with quick and accurate therapy, the leg will appear normal, but in fact, may actually have a large lesion just waiting for additional strain. The result could be damage too drastic to heal in a manner that will yield a sound horse. My advice is to have the injury evaluated by a veterinarian immediately, because the longer it takes to clear the injured area of inflammatory products and harmful enzymes, the more damage results, which, in turn, causes a prolonged recovery time.

Initial treatment includes local and systemic anti-inflammatory therapy. Bute is administered for three to seven days and DMSO is often applied topically for seven to 10 days. Ice or cold water therapy is applied for the first three to 10 days, depending on the amount of swelling. A properly applied bandage with adequate padding is important for the support of the injured tissues.

Rest is always the primary therapy, but after the acute phase of the injury has been treated, controlled exercise is an important part of the process. Controlled exercise can include hand walking and riding under saddle. Exercise is important in the remodeling phase of tendon and ligament healing. The fibers of the tendon or ligament are normally lined up in a longitudinal fashion. In order to heal at maximum strength, the fibers must heal in an organized manner. If there is no stress on the injured structures, the fibers will heal in an unorganized manner. The stress of riding or hand walking causes the healing fibers to follow the lines of stress and heal in a more structurally sound longitudinal pattern. An organized healing pattern results in a more flexible tendon or ligament and is therefore less likely to be reinjured. A tendon or ligament that heals with an unorganized matrix lacks the elasticity of a normal tendon or ligament and is more likely to sustain future injury during loading. As the tendon or ligament progresses in the healing phase, turnout may be possible, but this part of the therapy is always managed based on the results of the ultrasound exam. The long-term rehabilitation program will be determined by the degree of injury

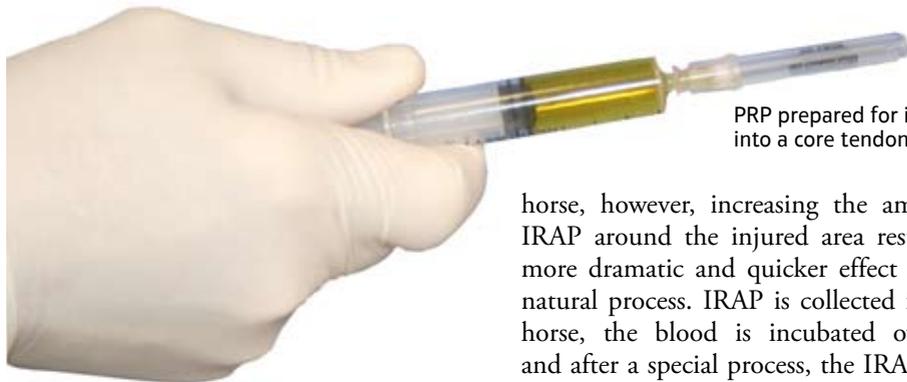
and the response to medical treatment. These sorts of programs should be devised with the veterinarian overseeing the case.

Other therapies include injecting the injured area with hyaluronic acid for its anti-inflammatory effects. Platelet rich plasma (PRP), stem cells and interleukin receptor antagonist protein (IRAP) are also used to aid in the healing process. PRP uses the horse's own platelets. The platelets are concentrated in a special centrifuge resulting in a sample that is about five times as concentrated as normal blood. The concentrated platelets have growth factors that stimulate the healing process. The process is very safe since it uses a product derived



This illustration depicts a bowed tendon.

Your Horse's Health



PRP prepared for injection into a core tendon lesion.

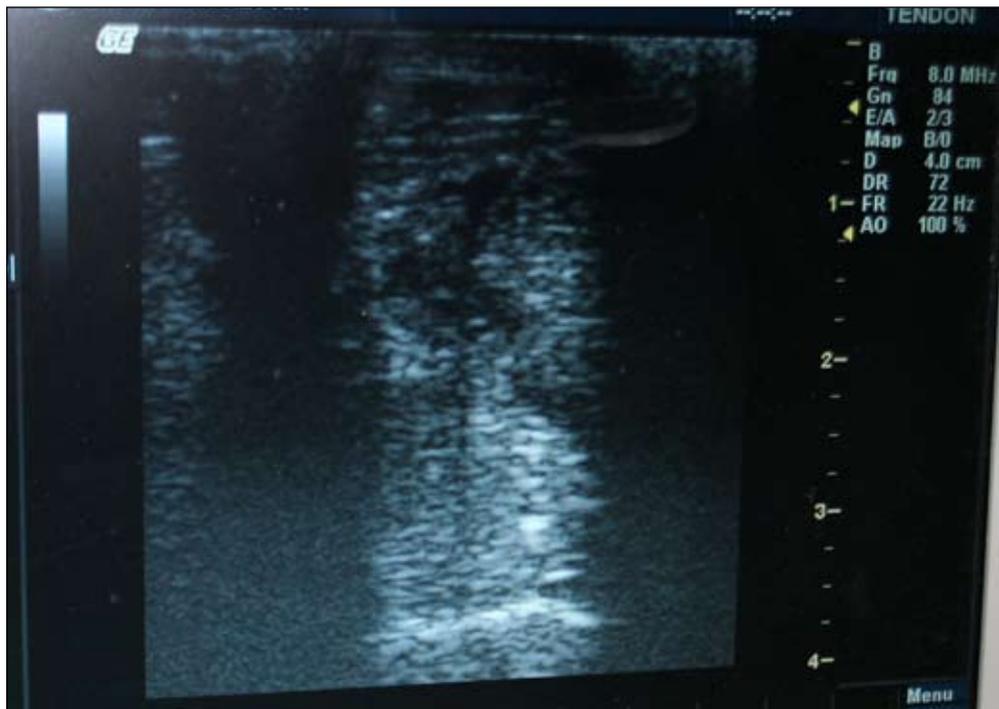
from the patient's own body. Stem cells can be obtained from the patient's fat tissue or bone marrow and then injected directly into the affected tendon or ligament. Stem cells are primitive cells that can grow into different body cell types, such as cartilage, bone, or the collagen that makes up tendon and ligaments. This process takes longer than the PRP because typically the stem cells are sent off for culture and this can take several days. Horses treated with stem cells and PRP tend to have improved histological scores, or better fiber patterns, than untreated tendons or ligaments.

IRAP is not a regenerative therapy, but it is an anti-inflammatory therapy that blocks interleukin-1. Interleukin-1 is one of the major inflammatory substances the body releases during an injury. The process of IRAP production occurs naturally in the

horse, however, increasing the amount of IRAP around the injured area results in a more dramatic and quicker effect than the natural process. IRAP is collected from the horse, the blood is incubated overnight, and after a special process, the IRAP can be injected into the injured area the next day. IRAP is an alternative to injecting steroids into injured tendons or ligaments.

Shoeing is also an important part of therapy. It is important to know exactly which structure is injured because the superficial digital flexor tendon (SDF) and the suspensory ligament do not respond well to being wedged up. Wedges do, however, cause relaxation of the deep digital flexor tendon (DDF) and the interior check ligament and can be useful in certain cases. A knowledgeable farrier and equine veterinarian working together are an important part of the tendon and ligament therapy team. Proper shoeing that avoids the common long toe/underrun heel complex and is balanced from medial to lateral is also a very important aspect of tendon and ligament injury prevention.

Shockwave therapy works by increasing blood flow to the injured site. It also



This ultrasound shows a core tendon lesion.

► About Steve Fisch, DVM



Dr. Steve Fisch owns AVS Equine Hospital, a full-service hospital and reproductive center in Tallahassee, Fla., where he and other equine veterinarians operate a referral hospital for surgery and performance-related lameness. Their website address is www.avsequinehospital.com.

increases metabolism in ligaments and, to a lesser degree, in tendons. Shock wave therapy tends to work better in areas where bone meets soft tissue, such as at insertions where tendons attach to bones. There are surgeries practiced in tendon and ligament therapies, however, they are reserved for special cases and are beyond the scope of this article.

Tendon and ligament injuries can mean the end of a horse's career. However, taking measures such as employing training methods to develop adequate fitness in the horse to perform its job and ensuring the performance surfaces you run on are as safe as possible for the job you are asking the horse to do go a long way in preventing injuries to these important structures. Nutrition and environment in which the foal is raised are also key factors. Breeding horses with a history of soundness has its effect in the overall picture, as well.

Once an injury has occurred, the key to getting your equine athlete back to performing is a quick and accurate diagnosis along with immediate and aggressive treatment. A good rehabilitation program is the icing on the cake to get you and your horse back to the winner's circle.

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