

Tendon

Preventing and treating tendon

and ligament injuries.

By Dr. Steve Fisch

TROUBLES,

Ligament LOSSES

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TENDON AND LIGAMENT INJURIES ARE A COMMON SOURCE OF lameness in performance and racing American Quarter Horses. Those injuries cause lost performance time and are a major source of economic loss in training days, veterinary bills and time, and can quickly end an equine athlete's career. Both structures have great stresses applied to them, whether it is a racehorse running full steam at 55 mph with its entire weight momentarily on one leg or a cutting horse maneuvering at quick speeds, using repetitive motions as he cuts a cow from the herd.

Tendons connect muscle to bone and ligaments connect bone to bone. Tendons and ligaments are the connections that hold bones in place and allow the muscles to create propulsion to move the horse. Both tendons and ligaments are made of collagen fibers that are arranged lengthwise so that they are capable of stretching. Collagen is a tough protein substance found in skin, tendons, ligaments, cartilage, bone and other connective tissues. Collagen allows tendons and ligaments to stretch and gives them their strength. Tendons and ligaments

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Dr. Steve Fisch ultrasounds the left hind for ligament damage.



are similar in structure but tendons are generally more flexible and have more stretching capability.

Prevention

HARDER, FIRMER SURFACES PUT MORE stress on joints and bones, but softer and more yielding surfaces put more stress on tendons and ligaments. Therefore, a balance between too soft and too hard must be found.

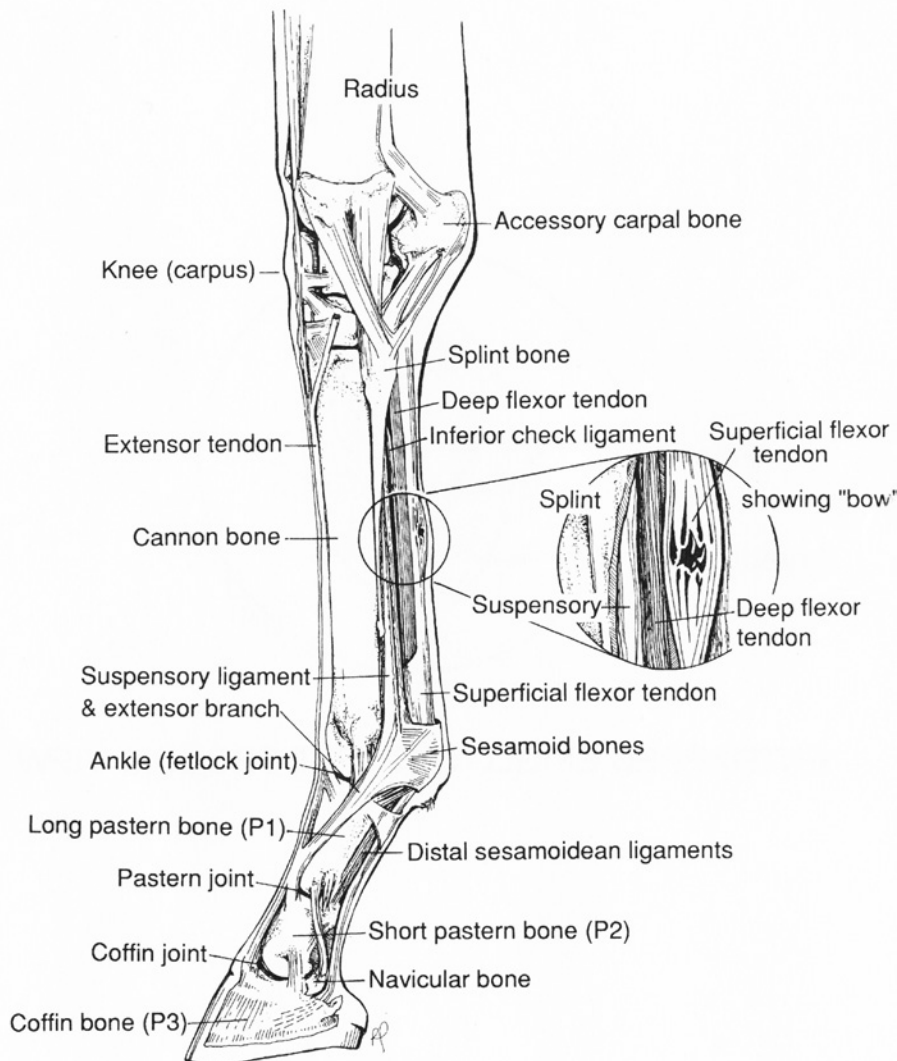
Racing Quarter Horses perform on many types of track surfaces around the country. Some tracks, such as those that also race Standardbreds, might have surfaces that are far too hard. Those tracks might result in very fast speeds, but those extremely hard surfaces probably also result in too many bone and joint injuries.

On the other hand, breaking from the starting gate or racing on loose or sandy surfaces can cause problems because of the need for traction when breaking or racing at high speeds. Loose footing lends itself to causing forelimb flexor tendon injuries, along with muscle strains, back soreness and suspensory ligament injuries.

Arena surfaces are also safer when the proper balance between soft and hard is found. It might seem safer for a barrel horse to compete in a deeper arena, but the looser footing can cause the horse to stretch and tear tendons and ligaments as it fights for traction or attempts to drive home with a burst of speed after the last barrel.

Along with providing the proper surfaces for the equine athlete, prevention of tendon and ligament injuries begins at foaling. It is important for babies to have the ability to run and play on pasture as they mature. Horses that are allowed to exercise freely as young maturing horses tend to develop 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. That's a good reason to know where and how the horses that are bought as young prospects were raised. All other factors being equal, a yearling that was raised in a pasture with other weanlings and yearlings to play with will develop stronger ligaments and tendons.

Prevention also includes proper fitness and training programs. 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 be 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.



FORELIMB SHOWING "BOWED" TENDON

Proper shoeing that avoids additional stress on the tendons and ligaments is also an important aspect of prevention. The common long toe/under-run heel complex strains these structures, and causes an imbalance from medial to lateral. A good farrier will keep the foot balanced.

Post-Injury Diagnosis

MANY SIGNS OF TENDON AND LIGAMENT INJURY ARE OBVIOUS: They include heat, swelling and lameness.

However, some injuries, such as to a suspensory ligament, might show no obvious sign of swelling or heat. The only sign might be a decrease in performance. For example, a racehorse might not break from the gate as well if it has rear leg suspensory ligament "desmitis" or inflammation. A western pleasure horse might not be able to keep the proper cadence but not exhibit any other clinical signs. A correct diagnosis can only be made with a thorough physical exam by a veterinarian, including palpation, watching the horse move out of his stall, and watching him walk, jog or trot.

Tendon and ligament injuries can also be diagnosed with ultrasound. Lesions appear on ultrasound as a dark spot in the tendon. Sound waves bounce back from intact fibers, but not from fluid. With a tendon or ligament injury, the space where

fibers are torn is filled with fluid. The larger the tear, the more fluid will fill the defect and the greater the “black hole” appears on screen. Generally, the larger the black hole, the worse the prognosis.

Alternatively, some injuries will appear as a thickening of the ligament or tendon and will appear whiter on the ultrasound. 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 might appear worse than it actually is. The fluid surrounding the injury can erroneously 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, cold therapy and support wraps will reduce the inflammatory fluid in the area of injury and allow for a more accurate ultrasonographic diagnosis.

The ultrasound diagnosis is usually designated as Type 1 through Type 4. The definitions are:

- 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 have more than 50 percent of the cross-section area of the tendon or ligament as anechoic or dark with fluid
- 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 there are some drawbacks to this. MRIs are significantly more expensive, and in most cases, the horse has to be under general anesthesia for the procedure. This makes MRI an unlikely first choice for diagnosis.

If your horse seems to have an injured tendon or ligament, it is safest to have it seen by a veterinarian immediately. The longer it takes to clear the injured area of inflammatory products and harmful enzymes, the more damage results, which causes prolonged recovery time.

Even if the swelling and lameness have subsided after 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 might have a large lesion that with additional strain will result in damage that cannot heal in a manner that will yield a sound horse.

Healing

TENDONS AND LIGAMENTS HEAL MORE SLOWLY THAN ANY OTHER structural part of the body, and an injury might require several months to a year or more of treatment and rehabilitation. Treatment for these injuries always starts with therapy aimed at reducing inflammation.

The initial therapy usually includes local and systemic anti-inflammatory therapy, such as phenylbutazone for three to seven days and DMSO applied topically for seven to 10

Dr. Joe Fisch wraps a leg to support it while it is healing.



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 also 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 healing. 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. 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. This results in a tendon or ligament that is more flexible and is therefore less likely to be re-injured. A tendon or ligament that heals with an unorganized matrix lacks the elasticity of a normal tendon or ligament and is more likely to result in future injury when pressure is applied to the leg.

As the tendon or ligament progresses in the healing phase, turnout might be possible, but this part of the therapy is always managed using 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, and should be devised with the veterinarian overseeing the case.

Additional Therapies

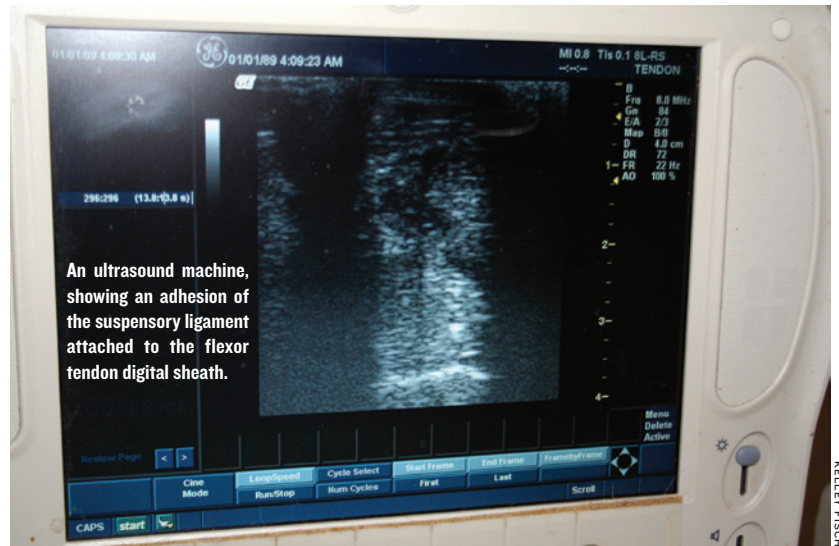
OTHER THERAPIES INCLUDE INJECTING THE INJURED AREA WITH hyaluronic acid for its anti-inflammatory effects. Procedures using platelet-rich plasma (PRP), stem cells and interleukin-1 receptor antagonist protein (IRAP) are also used to aid in the healing process.

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 from the patient's own body.

Stem cells can be obtained from the patient's fat tissue or bone marrow and then are 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 to a laboratory for culture, which 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, which is one of the major inflammatory substances the body releases during an injury. IRAP is an alternative to injecting steroids into injured tendons or ligaments. Even though IRAP production occurs naturally in the horse, increasing the amount



An ultrasound machine, showing an adhesion of the suspensory ligament attached to the flexor tendon digital sheath.

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of IRAP around the injured area results in more dramatic and quicker effects than the natural process. IRAP is collected from the horse and the blood is incubated overnight. After a special process, the IRAP is injected into the injured area the next day.

More Treatment

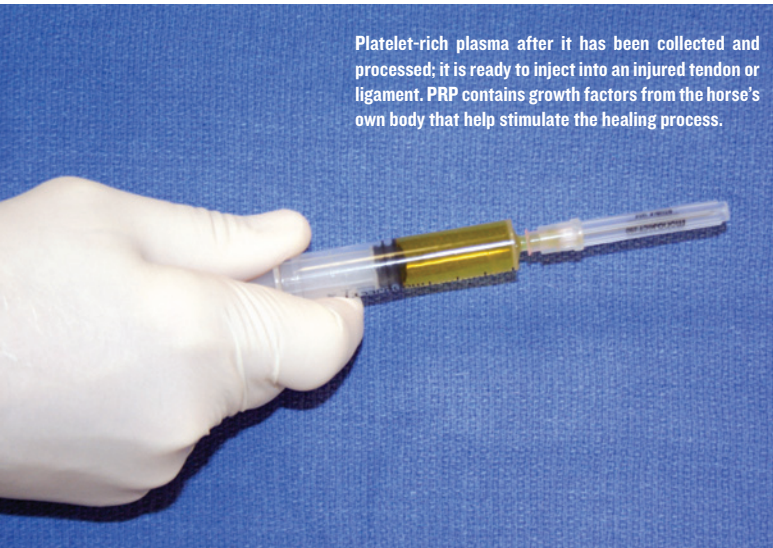
SHOEING IS ALSO AN IMPORTANT PART OF THERAPY. IT IS IMPORTANT to know exactly which structure in the leg is injured, because shoeing treatment depends on this information. Superficial digital flexor tendon and suspensory ligament injuries, for example, do not respond well to the foot having a heel wedge pad applied. However, heel wedges do cause relaxation of the deep digital flexor tendon and the inferior check ligament, and are a good solution for these types of injuries. A knowledgeable farrier and equine veterinarian working together are an important part of the tendon and ligament therapy team.

Shock-wave therapy tends to work by increasing blood flow to the injured site by increasing 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 that are used in tendon and ligament therapies. However these surgeries are reserved for special cases and are beyond the scope of this article.

Keep a Watchful Eye

TENDON AND LIGAMENT INJURIES CAN MEAN THE END OF A horse's career. However, precautionary measures go a long way in preventing injuries to these important structures. Once the 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 that will get you and your horse back to the winners circle. 🐾

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Platelet-rich plasma after it has been collected and processed; it is ready to inject into an injured tendon or ligament. PRP contains growth factors from the horse's own body that help stimulate the healing process.

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