Rehabilitation of Equine Tendonitis and Desmitis

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Abstract

This presentation details the methods utilized in the rehabilitation of tendon and ligament injuries in the horse. It will briefly discuss the healing of tendon and ligaments and to utilize the healing phases in the development of a rehabilitation plan. It will the participant with the therapeutic modalities commonly used in equine tendon and ligament rehabilitation and it will aid the participant in the formulation of a rehabilitation plan.

Key Words

Rehabilitation, Tendons, Ligaments

Tendons and ligaments are dense fibrous connective tissues characterized by a precise organization of sparse fibroblasts embedded in a highly organized collagen-rich extracellular matrix (ECM). The complex structural hierarchy permits plastic deformation under high-tensile loads. Collagen fibers are organized in parallel bundles along lines of tension. Spindle-shaped fibroblasts are arranged longitudinally between the bundles of collagen fibrils. An extensive three-dimensional network of cytoplasmic extensions wrap around the bundles of collagen fibrils and provide a means of cell–cell and cell–ECM communications.

Tendon and ligament are similar soft tissue structures that perform related yet distinct functions. As a result, they have similar ultrastructure and histological appearance with appropriate

differences in organizational, cellular, biochemical, and molecular characteristics. Tendons transfer the forces generated by muscle contraction into skeletal movement, provide skeletal support, and increase the efficiency of locomotion by storing and releasing energy. Tendons are required to withstand high-tensile forces. Ligaments align and stabilize adjacent bones and provide passive resistance to motion. Ligaments are subjected to forces from a number of directions depending on the range of motion of the joint. These distinct functions lead to clear structural differences. The collagen fibers in tendon are arranged in a strict parallel pattern, whereas those in ligament are more randomly arranged and with less mature crosslinks. Ligaments contain a slightly lower total collagen content with a higher ratio of type III collagen and a higher glycosaminoglycan (GAG) content.

The pathophysiology of tendon and ligament injury is the focus of intense research and educated debate in both human and veterinary medicine. Injuries are broadly classified as resulting from extrinsic or intrinsic damage. Extrinsic injury is frequently associated with a sharp laceration or a traumatic blow that physically damages the tendon or ligament. Intrinsic damage is associated with a degenerative condition within the tendon or ligament proper. Most research is focused on intrinsic injury

Tendon and ligament go through three overlapping phases of healing. These stages of healing are similar to of those of wound healing: (1) acute inflammation, (2) regenerative, and (3) remodeling. As healing progresses, collagen synthesis increases, and the collagen becomes increasingly organized and cross-linked, resulting in increased tensile strength and the ability to withstanding increasing loads over time. The rehabilitation program is designed to match the phase of healing of the tendon or ligament and the associated tensile strength of the tissues. Healing occurs much more slowly in tendons and ligaments than in most other tissues, making it critical

that the rehabilitation process be tailored to accommodate the delayed increase in mechanical properties.

The following management options are assuming that there has not been a complete disruption or transection of the tendon or ligament and that the structure is not critical for maintain joint integrity.

Monitoring of Healing

It is very important that tendons and ligaments be evaluated frequently during the rehabilitation period. One must be able to make adjustments to the protocol based on both quantitative and subjective evaluation. At this time the gold standard for quantitative evaluation of the severity of the injury and the healing process is MRI. However, this may not be feasible due to location of injury, expense or the lack of availability. The next best quantitative method is going to be diagnostic ultrasound. It is important to realize that while diagnostic ultrasound is sensitive it does tend to under estimate the degree of injury or healing. After this everything else is either subjective or are indirect measurements and are not direct measurements of healing. Subjective measurements include digital palpation, range of motion, external measurements (i.e. limb circumference), degree of lameness and the decreased need for analgesics. Indirect measurements include thermography, pressure algometry, pressure mats and force plates. Whatever method(s) is selected it is important to standardize evaluation times (unless there is a sudden worsening) and the technique (i.e. use the same ultrasound settings at each evaluation)

Management of Acute Injuries

Acute injuries should be managed by the application of cold, administration of NSAID's, immobilization and stall confinement. Low level Laser Therapy can be used during this time for its anti-inflammatory effect. The duration of this treatment will be dependent upon the nature and

severity of the injury. In most cases a minimum of 48-72 hours is needed, however some cases may require up to 96 hours. As soon as the acute inflammation has subsided the tendon or ligament should be thoroughly examined with diagnostic ultrasound to determine the extent and severity of the damage. It is important to realize that the ultrasonographic appearance of the lesion may continue to worsen over the next several days however by 10-14 days post injury the size of the lesion should be stabilized. Diagnostic ultrasound is utilized throughout the healing process to monitor healing and to determine the progression of healing

Management during the Regenerative Phase

Treatment during this phase is directed towards the healing process. Modalities that can be used to stimulate healing include Low Level Laser Therapy, High Intensity Laser Therapy, Therapeutic Ultrasound. Radiofrequency Therapy and the institution of controlled and progressive mobilization. At this stage hand walking may be instituted and well as passive movement of the involved segment. Tendons and ligaments remodel along the lines of stress so early loading can be important in healing. Additionally, early mobilization can decrease adhesion formation. In the case of injury to the flexor apparatus, an articulated brace can be used to provide progressive loading of the flexor tendons, while protecting them from sudden overload.

Regenerative, Scaffold and Crosslinking Brace therapies can be utilized during this period. Regenerative therapies include Expanded Stem Cell administration (autogenous or allogeneic), Vascular Stromal Fraction Therapy, Bone Marrow Concentrate therapy and Platelet Rich Plasma. Biological extracellular scaffolds can be utilized to provide scaffolding for fibroblastic proliferation. Crosslinking Braces can be injected to provide mechanical support to the injury.

Hyperbaric Oxygen therapy has been shown to increase the numbers of circulating stem cells in the body, stimulate microvascular ingrowth, decrease edema and provide oxygen to

hypoxic cells. The duration of this treatment will be dependent of the degree of healing and the patients comfort level. There are no hard and fast rules that determine how fast to progress. As the defect begins to fill in, become more echogenic and pain to palpation subsides then therapy is progressed.

Management during Remodeling Phase

The goal of therapy during this stage is to restore the structure to as normal as possible. The involved structure is progressively loaded during this period. Articulated braces may also be used during this period in the case of flexor apparatus injury. Early in this period Aquatic Therapy may be introduced. The underwater treadmill provides excellent exercise while decreasing the load bearing on the limbs due to buoyancy. Swimming may be utilized with caution as rear limb injuries, back pain and drowning are potential complications.

During this stage stall confinement is decreased and small paddock turn out is allowed. Additionally, tack walking may be instituted. Deep footing should be avoided as well as hard, slick surfaces. Both of these may make a healing injury worse. As healing progresses the frequency, duration and intensity of exercise increases. Different surfaces may be introduced

Other therapies during this phase would be extracorporeal shockwave and therapeutic ultrasound. Both of these can be utilized to aid in remodeling of scar tissue. In fact I use therapeutic ultrasound prior to an underwater treadmill session to increase extensibility of the tendon or ligament.

Other

It is know that a horse that is confined to a stall loses bone density. Because of this we utilize Whole Body Vibration therapy 2-3 time daily. It is the one condition where it has possible efficacy.

Nutrition is very important during this healing time. Diet must be controlled so that the horse does not gain excessive weight but yet nutrients that supply critical elements for healing must be provided. All of these nutrients are not available in a forage alone diet so a concentrate or supplement must be provided. The type of concentrate or supplement utilized will also depend on the individual. For instance a grain based concentrate should not be utilized in an individual that has Equine Metabolic Syndrome. A balanced diet that is forage based is best. I recommend that stalled individuals be fed good quality hay/legume forage via a slow feeder. This promotes continuous browsing which reduces boredom and increases salvia production to combat gastric ulcers. This diet is supplement with an appropriate concentrate or ration balancer that will provide the necessary building blocks for tissue healing and regeneration. We also recommend feeding an Omega 3 supplement for its anti-inflammatory effects.

One should not neglect the rest of the horse. Support of other limbs, daily foot care and grooming, bedding, and mental stimulation are all important. To counteract boredom in stall play toys or having a companion available will benefit the individual.

Rehabilitation of equine tendon and ligament injuries is more the stall confinement and bandaging. Many techniques and modalities are available to aid in the return to a useable life regardless of the individual's occupation. While some injuries can take up to a year or more to recover we are finding that with the utilization of a properly designed rehabilitation program months can be taken off the overall healing time with the added benefit of better quality repair.

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