Treatment Options for Hindlimb Proximal Suspensory Desmitis

Column Editor

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Proximal suspensory desmitis (PSD) of the hindlimb is a major cause of equine lameness, particularly in show and sport horses. Healing of the suspensory ligament often takes several months, resulting in extended layoffs, an increased chance of recurrence, and, in some cases, chronic lameness. Numerous treatments have been attempted to return affected horses to soundness in a timely fashion. Only a few treatments have been evaluated in controlled, scientific studies. Some therapies have become increasingly popular based on anecdotal reports. This article reviews the basic treatment options for PSD and some of the associated literature.

Hindlimb PSD has traditionally had a guarded prognosis for return to athletic soundness, but recent literature suggests a more reasonable prognosis, with 80% or more horses returning to soundness. Treatment options include periligamentous injections, shock-wave therapy, intralesional injections, surgery, and rest.

Periligamentous injections of steroids with or without Adequan (Luitpold Pharmaceuticals) or Sarapin (High Chemical Company, Levittown, PA) have been successfully used to treat PSD in horses with acute onset of the condition without significant ultrasonographic changes. Successfully treated horses are sound within 2 weeks. If a horse fails to respond to periligamentous injections, an alternative therapy (e.g., shock-wave therapy, intralesional injections, surgery) may be needed.

SHOCK-WAVE THERAPY

Shock-wave therapy has gained popularity during the past several years. The effects of extracorporeal shock-wave therapy on collagenase-induced equine forelimb suspensory ligament desmitis were evaluated.[1] The results of ultrasonography showed that the treated limbs had a smaller percentage of lesions at the maximal injury zone as well as decreases in the total percentage of lesions, total fiber alignment, and total echogenicity. The treatment of chronic or recurrent PSD has been evaluated using radial pressure-wave therapy.[2] Horses were treated three times at 2-week intervals. The results revealed that 41% of patients with affected hindlimbs and 53% of patients with affected forelimbs returned to athletic soundness within 6 months of treatment. The ultrastructural and immunocytochemical effects of shock-wave therapy on experimentally induced PSD were evaluated.[3] The results indicated that the lesion size was significantly smaller in the treated group, with more small, newly formed collagen fibrils and greater expression of transforming growth factor (TGF)–β.

Shock-wave therapy typically consists of three treatments, 10 to 14 days apart. The number of shocks used is subjective; the average is 1,500. Shock-wave therapy can be used alone or in conjunction with other treatments. Focused shock-wave therapy is thought to be superior to radial therapy because the energy from the radial unit disperses at the skin.

INTRALESIONAL INJECTIONS

The intralesional injections used to treat PSD involve stem cell therapy, ACell Vet (ACell Inc., Jessup, MD), bone marrow injections, and platelet-rich plasma.

ACell

ACell Vet powder is an extracellular matrix of proteins, including collagen, glycosaminoglycans, and other small glycoproteins, derived from the porcine urinary bladder. These proteins form a three-dimensional scaffold to which fibroblasts can migrate and adhere and where they can deposit and organize new tissue.

The treatment of PSD using ACell Vet consists of an intralesional injection of 0.2 g suspended in 6 ml of saline using ultrasound guidance. In a case series of horses with tendon or ligament damage, 101 horses were treated with ACell Vet.[4] The overall success rate of the horses treated with ACell Vet was approximately 80%. It should be noted that all the hindlimb proximal suspensory cases also had proximal metatarsal fasciotomy performed in conjunction with the injection.

Of horses treated with ACell Vet, 19% experienced mild to moderate pain within 24 hours, and 82% had hindlimb edema 3 days after injection. In other species, it is known that the use of ACell Vet powder in injured tissue causes a profound angiogenesis response and an acute inflammatory response in the first 5 to 7 days. The results of this early study warrant further investigation in a controlled, blinded study on the treatment of ligament and tendon injuries.

Autogenous Bone Marrow

Over the past 5 years, the use of mesenchymal stem cells to treat tendon and ligament injuries in horses has gained popularity. The use of autogenous bone marrow injections as a source of stem cells to treat suspensory desmitis in horses has been reported.[5] This study evaluated 100 horses, of which only 19 had hindlimb suspensory desmitis. In all the horses, 20 to 30 ml of bone marrow was removed from the sternum and transferred to 6-ml syringes; then the lesions were injected using ultrasound guidance. Fifteen horses also had retinaculum resections at the time of the injection. Of the 100 horses treated, 84 returned to full work and soundness within 6 months. The potential beneficial effects of bone marrow injections might be contributed to the mesenchymal stem cells in bone marrow. The pluripotent mesenchymal stem cells might differentiate into mature tendon or ligament fibro-

Key Points

- Shock-wave therapy, intralesional injections, and surgery are viable treatment options for proximal suspensory desmitis.
- The challenge is determining which treatment option is best for a particular horse.
- Scientific research regarding some treatments is needed to determine their mechanism of action and potential beneficial effects in treating proximal suspensory desmitis.

blasts under the signaling influence of tendon or ligament tissue to produce the appropriate matrix components for repair.[6]

Autologous Stem Cells

Autologous stem cell implantation (VetCell Bioscience, London, UK) has recently become available in the United States. This technique was previously only available in the United Kingdom. Autologous stem cell implantation involves harvesting bone marrow, isolating the mesenchymal stem cells, and expanding them in culture—a process that takes approximately 18 days. The cultured cells are then resuspended in bone marrow supernatant and returned to the veterinarian. A suspension containing approximately 5 million autologous stem cells is then injected directly into the lesion using ultrasound guidance. The advantage of this process is the ability to inject a much higher number of stem cells. No scientific or retrospective studies are investigating the efficacy of this product.

Adipose-Derived Stem Cells

Adipose-derived autologous stem cells are available from Vet Stem, Inc., Regenerative Veterinary Medicine (Poway, CA). Adipose tissue is thought to contain 2% to 4% mesenchymal stem cells. This procedure involves harvesting 15 to 20 g of fat from a site lateral to the tailhead in a standing, sedated horse. The fat is placed in the provided transport media and sent to the laboratory for isolation of the nucleated cells, of which some are mesenchymal stem cells. These cells are returned to the veterinarian within 48 hours of harvesting and are then injected using ultrasound guidance.

A preliminary investigation[7] evaluated adipose-derived stem cells in a collagenase model of flexor tendonitis. Four horses had the stem cells injected intralesionally, and the other four horses were injected with the carrier (phosphate-buffered saline). The tendons were evaluated using ultrasonography once weekly during the 7-week study and also on histologic examination after death. There were no significant differences between the treated and untreated groups on ultrasonography; however, cartilage oligomeric matrix protein expression was significantly increased in the stem cell–treated horses. This protein may play an important role in the early events of collagen fibril formation. The histologic examination scores of the stem cell–treated group showed significantly improved tendon fiber architecture, reduced inflammatory cell infiltrate, and improved tendon fiber density and alignment. A composite tendon-healing score was significantly greater in the stem cell–treated group.

Anecdotal success is encouraging, but more scientific research is needed.

Platelet-Rich Plasma

Platelet-rich plasma is produced by processing whole blood to obtain the blood fraction with the highest concentration of platelets. The α granules within platelets contain a number of growth factors that are released during platelet activation. Large amounts of TGF-β and platelet-derived growth factor, with smaller amounts of insulin-like growth factor, epidermal growth factor, and TGF-α, are found in human blood after platelet activation.[8] The synergistic effects of these growth factors attract healthy inflammatory cells to an injured

area, where they induce angiogenesis, fibroplasia, and reepithelization. A recent study[9] showed that platelets and TGF-β1 can be concentrated reliably from equine blood. The described technique involves harvesting whole blood, processing it to obtain the platelet-rich plasma, and injecting the plasma intralesionally. No scientific study has demonstrated the effectiveness of this product, but anecdotal reports indicate some success using this treatment.

SURGERY

There are currently two surgical options for the treatment of hindlimb PSD—fasciotomy with plantar metatarsal neurectomy[10] and desmoplasty with fasciotomy.[11]

Fasciotomy with Plantar Neurectomy

The horse is placed under general anesthesia, and a 4-cm incision is made adjacent to the lateral border of the superficial digital flexor tendon, starting at the level of the tarsometatarsal joint and extending distally. The deep branch of the lateral plantar nerve is isolated, and a 3-cm piece is removed. Fasciotomy of the deep laminar metatarsal fascia is performed directly plantar to the suspensory ligament and extended for 6 cm. Of the 20 horses that have been treated in this manner, 19 returned to their previous level of exercise, with only two horses experiencing a recurrence of PSD.[10]

Desmoplasty with Fasciotomy

Percutaneous desmoplasty with fasciotomy to treat PSD were recently reported[11] in horses that did not respond to stall rest. The horses were anesthetized, and ultrasound-guided desmoplasty was performed using a tendon knife. To perform desmoplasty, the deep laminar metatarsal fascia has to be perforated, in effect performing a much smaller, more focal fasciotomy. Of the 27 horses treated, 23 had hindlimb PSD. Overall, 85% of the horses that were treated returned to full work after surgery and rehabilitation. All horses in this study had ultrasonographic evidence of healing of the suspensory lesions.

CONCLUSION

Hindlimb PSD can be a very frustrating, difficult problem to treat. New treatment options have become available to help treat horses with this problem. Further scientific research into some of these treatment modalities should help in treating these cases more successfully in the future.

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