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CASE REPORT REGARDING THE OUTCOME OF SHOCKWAVE THERAPY IN THE TREATMENT OF TENDINOPATHIES WITH LOW HEALING RATES IN SPORT HORSES

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Abstract

Tendinopathies in sport horses, particularly those with low healing rates, represent a major challenge in veterinary medicine. Shockwave therapy has shown promising significant effects, stimulating tendon tissue healing and reducing pain compared to conventional treatments. Deep digital flexor tendon (DDFT) injuries are common in sport horses and are caused by repetitive biomechanical stress. This study examines the success of shockwave therapy in managing insertional injuries of the DDFT with low healing rates in a 14-year-old female Oldenburg show-jumping horse. Clinical and imaging assessments through MRI revealed significant improvements in approximately three months of therapy, including reduced pain, increased mobility, and improved healing of the affected tendon. This case report aims to demonstrate that Shockwave Therapy (ESWT) increases the healing rate, reducing recovery time in sport horses.

Key words: *Shockwave, tendinopathy, horse, DDFT.*

INTRODUCTION

Tendinopathies are among the most frequent musculoskeletal injuries in competitive sport horses, often causing significant performance deficits and prolonged downtime (Morris & Carter, 2015). The disorder is characterized by the disorganization of collagen fibers, increased interfibrillar spaces, and the formation of scar tissue, all of which contribute to reduced tensile strength and functional integrity of the tendon (Jones et al., 2017). In recent years, attention has turned toward innovative treatment approaches such as shockwave therapy (Gonzalez & Reed, 2018). This treatment option has gained popularity in human and equine medicine due to its potential to stimulate neovascularization, promote collagen synthesis, and induce anti-inflammatory effects (Sherry et al., 2022; Smith et al., 2016).

Traditional management of equine tendinopathies has relied on rest, controlled exercise, and various medical treatments including nonsteroidal anti-inflammatory drugs and regenerative therapies (Morris & Carter, 2015). Despite these interventions, the healing process is often protracted, with a high incidence of re-injury reported in sport horses (Thompson et al., 2019). In contrast, shockwave therapy uses sound waves to mechanically stimulate cellular responses that facilitate tissue repair (Jones et al., 2017). Recent experimental studies have shown promising results, highlighting rapid improvements in tendon architecture and function when combined with standard rehabilitation protocols (Gonzalez & Reed, 2018; Sara Toner and Candice Crosby , 2023). However, clinical documentation of shockwave therapy in naturally occurring cases remains relatively scarce, particularly with low healing rates (Thompson et al., 2019).

MATERIALS AND METHODS

To characterize the diagnosis and evolution of tendinopathy treatment, the following method were used: orthopaedic examination, radiographic examination, Magnetic Resonance Imaging (MRI), Pro Stride therapy, shockwave therapy, and orthopaedic bracing.

The period analysed in this study was August-October 2024.The results obtained from the

methods applied in the clinic were processed by analysing the data, identifying trends, and evaluating the outcomes of each treatment. The data were statistically analysed to build a comprehensive overview of the treatment evolution for tendinopathies (Gagnier et al., 2013).

Patient History and Signalment

The subject, a 14-year-old female Oldenburg horse actively competing in show-jumping events, presented with left forelimb lameness that had been persistent since the previous year. Initially, the condition responded positively to coffin joint injections with PRP; however, by spring, the efficacy of the treatment diminished, with symptom relief lasting less than one month. Following a competition, the lameness reappeared. Diagnostic imaging, including MRI and ultrasonography, confirmed the involvement of the deep digital flexor tendon (DDFT) and the navicular bursa. The primary issue was ongoing lameness, which significantly impaired both the horse's athletic performance and training capabilities.

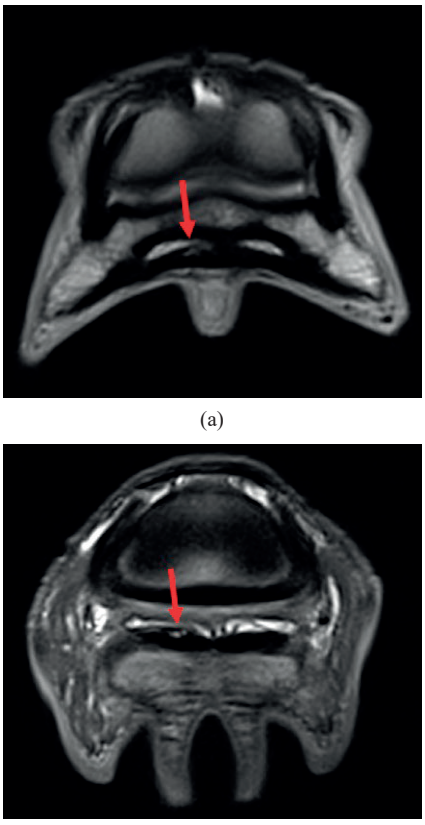
RESULTS AND DISCUSSIONS

Clinical examination and diagnostic work-up

A comprehensive clinical examination revealed moderate to severe lameness in the affected limb. The pre-treatment lameness score for the left forelimb (LF) was assessed as 1/5 on a straight line.

On a hard circle, the lameness score was recorded as 2/5 on both sides, the horse showing increased lameness on a hard surface. In addition to the physical examination, a diagnostic MRI revealed moderate active tendinopathy of the DDFT with two core lesions at the supra- and infra-navicular levels (Figures 1, 2). There was also moderate proliferative navicular bursitis with possible adherence formation, mild navicular bone changes suggestive of navicular disease, and mild bone oedema of the distal phalanx indicating aseptic pedal osteitis (Figure 3). Additionally, mild osteoarthritis of the distal interphalangeal joint was observed.

At the orthopedic consultation conducted in early August, including the SLEIP application for (objective gait analysis) evaluation, an increase in lameness severity was observed (Figures 4, 5). A treatment protocol was implemented, consisting of intrabursal regenerative therapy with Pro Stride, orthopedic shoeing and Shockwave therapy



(a)

(b)

Figure 1. MRI depicting core lesions in the deep digital flexor tendon (arrow). The lesions are at the infra-navicular (a) and supra-navicular level (b)

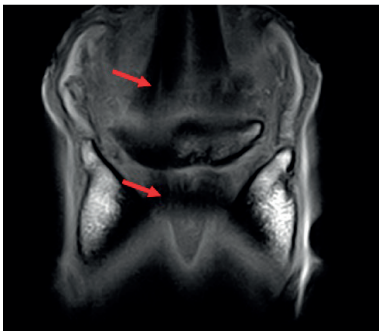


Figure 2. Two core lesions in the medial lobe of the DDFT at different levels (arrows)

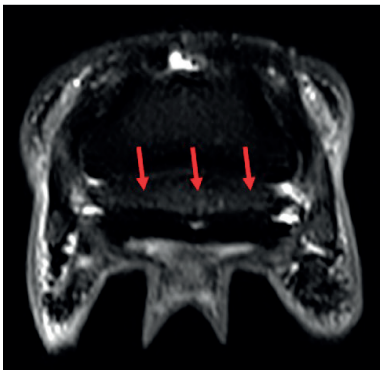


Figure 3. Navicular bone edema (arrows)

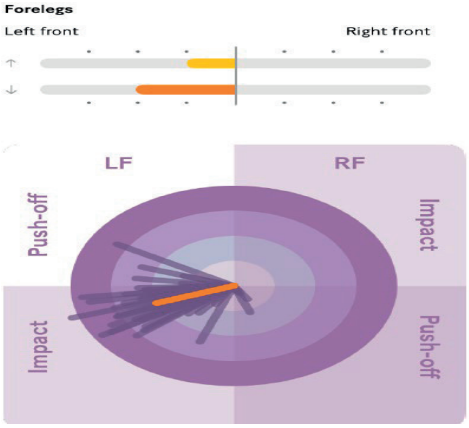


Figure 4. The image shows a SLEIP gait analysis, objectively confirming lameness progression in the left forelimb

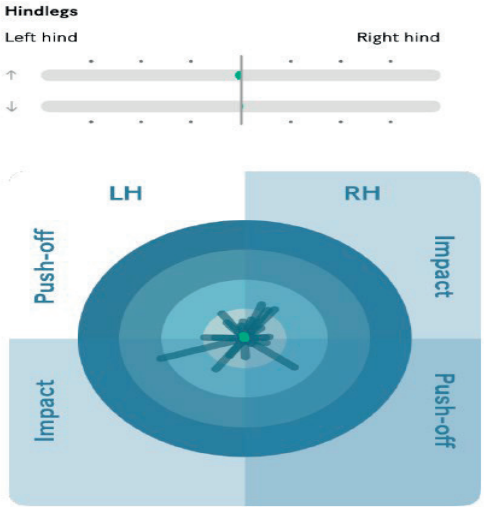


Figure 5. SLEIP gait analysis, confirms that the hind limbs show no signs of lameness

Treatment procedure

Considering the chronic nature of the condition and poor healing history, with the previously mentioned treatments, shockwave therapy was recommended as an adjunct treatment. The therapy was administered using a focused shockwave generator, calibrated to deliver an energy flux density between 0.12 and 0.20 mJ/mm². The treatment was administered every 7 days throughout 5 sessions, with each session consisting of 1000 pulses at a rate of 180 pulses per minute.

Selected treatment parameters were those recommended in recent veterinary studies referring to shockwave therapy (Sherry et al., 2022).

Pro Stride procedures were performed under aseptic conditions, using radiographic guidance to precisely target the podotrochlear bursa (Figure 6).

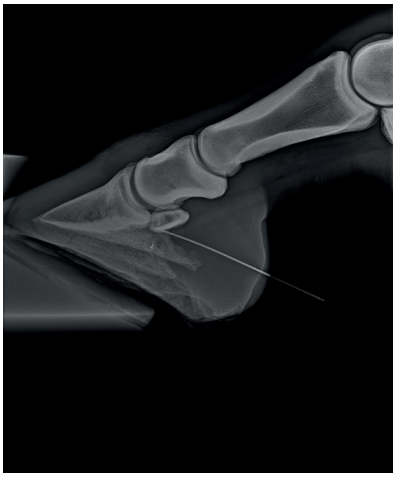


Figure 6: The X-ray image shows radiographic guidance for precise Pro-Stride injection into the podotrochlear bursa, ensuring accurate placement and effective treatment

The horse was sedated, and blood collection was performed only after asepsis of the site by well-trained personnel. Blood collection is performed by drawing 60 ml from the jugular vein into a syringe containing ACD-A anticoagulant. The first centrifugation step is conducted at 3200 rpm for 15 minutes, facilitating the separation of cellular components. Following this, platelet-poor plasma is removed, while 2 ml of platelet-rich plasma (PRP) is extracted from the side port. This PRP is subsequently transferred into

the APS Concentrator, where it is mixed with specialized beads designed to optimize protein enrichment. A second centrifugation step at 2000 rpm for 2 minutes further refines the solution. The final product, consisting of 2-3 ml of Autologous Protein Solution, is extracted via syringe and prepared for therapeutic application.

Rehabilitation Protocol

The shockwave sessions were integrated into a rehabilitation program. Following the first treatment session, the horse was placed on a controlled exercise regimen using hand-walking and gradually increasing on straight line. Pain management was strictly regulated with the transient administration of nonsteroidal anti-inflammatory drugs – Phenylbutazone 10 ml (2.2 mg/kg) for 7 days – during the initial post-treatment period. Consistent monitoring was implemented through serial lameness scoring SLEIP, as well as ultrasonographic, MRI, and radiographic evaluations.

After three months of treatment and a structured rehabilitation plan, significant improvements were observed. SLEIP gait analysis confirmed the effectiveness of the treatment protocol and the added benefit of Shockwave therapy, showing a substantial reduction in lameness in the left forelimb (Figure 7), MRI comparisons demonstrated notable healing, with improvements in the deep digital flexor tendon tear and a reduction in static navicular bursitis (Figures 8, 9).

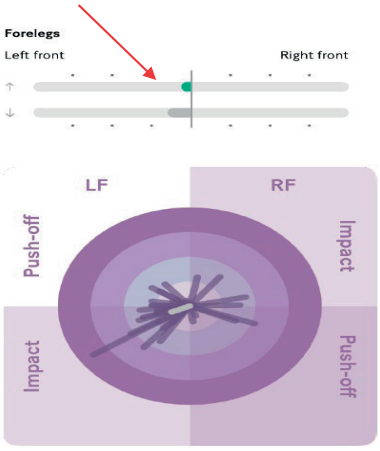


Figure 7. SLEIP gait analysis, highlighting the effectiveness of the treatment protocol and the added benefit of Shockwave therapy, confirming a significant reduction in lameness in the left front limb (arrow)

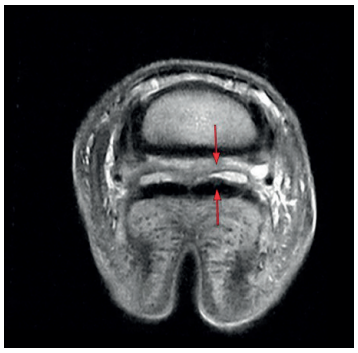


Figure 8. Improved deep digital flexor tendon tear, static navicular bursitis

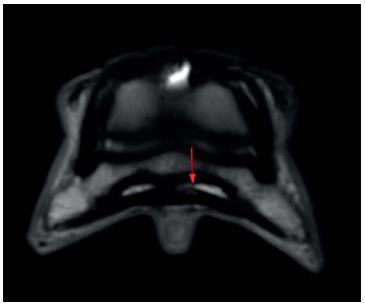


Figure 9. Prior MRI comparisons, based on previous imaging that initially revealed lesions at the infra-navicular and supra-navicular levels, two core lesions in the medial lobe of the DDFT at different levels, and navicular bone oedema, showed a significant improvement in the deep digital flexor tendon tear

This case report demonstrates the potential effectiveness of shockwave therapy in managing chronic tendinopathies in sport horses, particularly those with inherently low healing rates. Improvements were observed after three months of treatment due to a structured rehabilitation plan. Thus, significant SLEIP gait analysis confirmed the effectiveness of the treatment protocol and the added benefit of Shockwave therapy, showing a substantial reduction in lameness in the left forelimb. MRI imaging has demonstrated by comparison a notable healing process, with improvements in the deep digital flexor tendon tear and a reduction in static navicular bursitis. The subject's improvement, demonstrated by reduced lameness scores and improvements on MRI and ultrasonography, supports preliminary studies suggesting that mechanical stimulation induced by shockwaves can promote a regenerative response. The clinical findings reported herein are consistent with the

hypothesis that shockwave therapy facilitates the reorganization of collagen fibres and promotes biomechanical stability in injured tendon tissues (Jones et al., 2017). The application of shockwave therapy in this case not only expedited the reduction of pain and lameness but also provided objective improvements in tendon structure as visualized on ultrasonography.

In a comparative context, conventional management strategies including rest, anti-inflammatory medications, Pro-stride, and controlled exercise have been shown to yield variable healing times and a substantial risk of re-injury.

The mechanism of shockwave therapy is believed to be multifactorial. Biologically, the induced mechanical forces are theorized to stimulate growth factors such as vascular endothelial growth factor (VEGF) and promote the proliferation of fibroblasts essential for collagen matrix formation. Furthermore, by triggering a localized inflammatory response, shockwave therapy may catalyse the natural healing process, overcoming the stagnation observed in chronic injuries. In this context, the case findings suggest that targeted shockwave therapy could shift the tendon microenvironment towards one that is conducive to repair.

CONCLUSIONS

In this detailed case report, shockwave therapy demonstrated significant potential in the treatment of chronic tendinopathy in a sports horse with a history of low healing rates. Over three months of treatment, the combined objective improvements in lameness scoring - from a pre-treatment score of 1/5 and 2/5 to lame-free - and the significant reduction in lesion size observed on MRI highlight the effectiveness of this therapeutic protocol. In conclusion, the integration of shockwave therapy into a comprehensive rehabilitation program may accelerate functional recovery and improve structural tendon repair in sports horses suffering from chronic tendinopathies. This case provides a valuable reference point for future studies and contributes to the evolving understanding of advanced therapeutic strategies in veterinary sports medicine.

REFERENCES

Gagnier, J.J., Kienle, G., Altman, D.G., Moher, D., & Sox, H. (2013). The CARE guidelines: Consensus-based clinical case reporting guidelines. BMJ Case Reports, 2013, bcr2013201554.

Gonzalez, R., & Reed, L. (2018). Focused shockwave therapy in equine tendon injuries: Protocols and outcomes. *Veterinary Therapeutics*, 39(2), 178-185.

Johnson, Roderick B. Richards, David D. Frisbie, Angie M. Esselman, Scott R. McClure (09 October 2022): Equine shock wave therapy - where are we now?

Jones, A., Miller, B., & Harris, P. (2017). The biological effects of shockwave therapy on tendon repair: A review of the literature. *Journal of Equine Veterinary Science*, 45(4), 233-240.

Morris, D., & Carter, E. (2015). Treatment challenges in equine tendinopathies: Conventional methods and novel approaches. *Equine Sports Medicine*, 28(1), 55-62.

Nicola Lynch, Camilla J. Taylor, Tegan McGilvray, Rachel Tucker, Andy Bathe, Christopher R. B. Elliott, Roger K. W. Smith (2023). Desmitis of the accessory ligament of the deep digital flexor tendon in the forelimb: A retrospective case study of 91 horses. *Equine Veterinary Journal*.

Sara Toner, Candice Crosby (2023). Affiliations Expand: Pro-stride and extracorporeal shockwave therapy as treatment of lateral collateral desmopathy of the proximal interphalangeal joint in a *Dutch Warmblood gelding*, 64(3):268-274.

Smith, J., Thompson, M., & Greene, D. (2016). Shockwave therapy: A new era in the management of equine tendon injuries. *Journal of Veterinary Rehabilitation*, 10(3), 112-120.

Thompson, R., Edwards, S., & Wilson, J. (2019). Timing of shockwave application in tendinopathy management: A prospective study in sport horses. *Veterinary Clinical Studies*, 24(6), 405-412.