

Radial Extracorporeal Shock Wave Therapy for Chronic Insertion Desmopathy of the Proximal Suspensory Ligament

K. J. Boening, Dr. Med. Vet.; S. Löffeld, DVM; K. Weitkamp, Dr. Med. Vet.; and S. Matuschek, Dipl. Biol.

Extracorporeal shock wave therapy is a useful non-invasive method of treating chronic desmitis of the proximal suspensory ligament. Authors' addresses: Tierärztliche Klinik Telgte, Telgte-Germany (Boening, Löffeld, Weitkamp); and EMS Medical, Konstanz, Germany (Matuschek). © 2000 AAEP.

Introduction

In human medicine, extracorporeal shock wave lithotripsy is an established therapeutic procedure for treatment of renal calculi.¹ In the last few years extracorporeal shock wave therapy (ESWT) also has been used in human orthopedic treatment, especially chronic insertion tendopathy/desmitis such as "tennis elbow," tendinosis calcarea, and pseudarthrosis.¹

In the veterinary field, the use of ESWT is at the beginning. So far, there is little information about different indications, treatment regimens and long term results. Since June 1998, at the Tierklinik Telgte, Germany, horses with different orthopedic conditions have been treated with Radial Extracorporeal Shock Wave Therapy®.^a The aims were 1) to collect first experiences with the new therapy; and 2) to establish the treatment as standard indication for limited indications.

Therapy of chronic insertion desmopathy of the proximal suspensory ligament in equine front and hind limb is somewhat frustrating. This condition is characterized by a high rate of recurrence and low success rate. Systemic or local application of antiphlogistics and corticoids, blistering, combined with long periods without work and finally surgery (peripheral neurectomy) are described and documented.²⁻⁵ Long term follow up information about the treatment of chronic longstanding high suspensory desmitis are still missing in veterinary literature. This condition seemed to be ideal for ESWT treatment evaluation, for ESWT is known as a safe, alternative, non-invasive therapy without serious side effects.

Materials and Methods

For treatment in this group we used a system with pneumatic generated shock waves at low (0.16 mJ/

mm²) energy levels (Fig. 1). This system^a consists of a basic power unit and a hand piece with an applicator (Fig. 2). The tip of the applicator had a diameter of 6 mm. Horses were selected with the diagnosis of chronic desmopathy of the proximal suspensory ligament exclusively. The horses must have had clinical symptoms for at least three months, to avoid effects of spontaneous healing. Additionally, the horses should have been pre-treated unsuccessfully with other methods, e.g., with local or systemic antiphlogistics and corticosteroids.

All horses underwent a complete lameness examination including anamnesis, inspection, palpation, flexion tests, and diagnostic local anesthesia. Furthermore, all horses were moved in hand on hard and soft ground.

We used two standard views of the proximal suspensory attachment, anterior-posterior and 90° lateral-medial. The majority of the horses got an ultrasound scan with a 7.5 MHz linear scanner. In five horses we added a bone scan by the use of Technetium-99m.

Horses with any other systemic or orthopedic diseases—except suspensory ligament desmopathy—were excluded from the study.

Grading a successful therapy, the lameness was classified with an index from 0 to 4. An index of zero (0) means that the horse is completely free from pain as well from lameness, whereas lameness indicator (4) was significant lameness—nearly no weight bearing.

Horses with index 1 lameness were slightly irregular visible lame, more like a gait abnormality, where as horses with index 2 lameness were significantly regular slight lame. In lame horses with

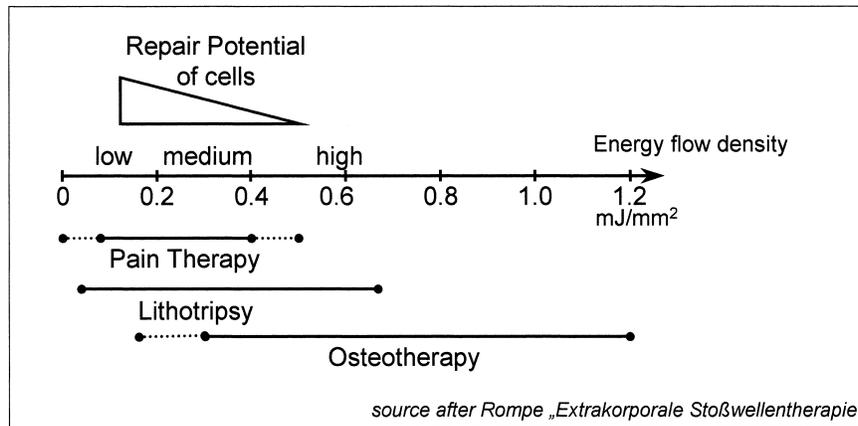


Fig. 1. Pain Therapy and energy levels in ESWT. The required energy densities for pain therapy are lower than in lithotripsy.



Fig. 2. Swiss DolorClast® Vet-Unit.

- Minimal weight and simple installation (“plug and treat”)
- Variable impulse frequency of 1 - 15 Hz
- Preset of impulse number
- Automatic impulse counter
- Working pressure up to 4 bar
- Minimal maintenance

index 3, the lameness was detectable in walk but very obvious in trot.

The ESWT treatment was performed on an ambulatory out-patient system with the horse standing, sedated with 30 μ g/KBW Domosedan^b or 1.8 mg/KBW Xylazine^c 2%; in none of the horses in this study was local anesthesia required.

The location for treatment was clipped and shaved and prepared with ultrasound gel to obtain maximum skin contact and minimum loss of energy while the shock waves were transmitting through the skin into deeper structures. The particular leg was lifted and the superficial and deep flexor tendon was pushed laterally or medially (Fig. 5). This exposed the origin of the suspensory ligament directly to the tip of the shock wave applicator.

For the treatment in this study we choose a working pressure of 2.5 bar, a frequency of 8 Hz and 2000 impulses per location. Manual pressure on hand piece was applied sufficient for the first ring on the force indicator to be covered by the distal screw cap. Related to the high impulse frequency and individual tolerance, treatment time was 5–15 min. Horses were bandaged for 2 days to protect the skin over the treated suspensory attachment area.

The treatment was repeated twice, with two to four weeks interval after the initial treatment; so the horse got at maximum three sessions of shock wave therapy. Four weeks and six months after the last treatment there was a follow-up examination to control improvement or deterioration.

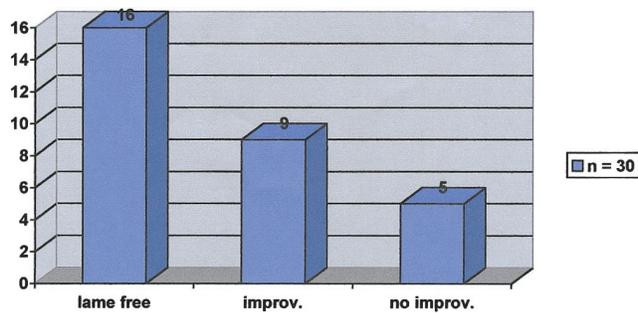


Fig. 3. Insertion desmopathy of the proximal suspensory ligament. Results of first follow-up lameness examination (4 weeks after last treatment).

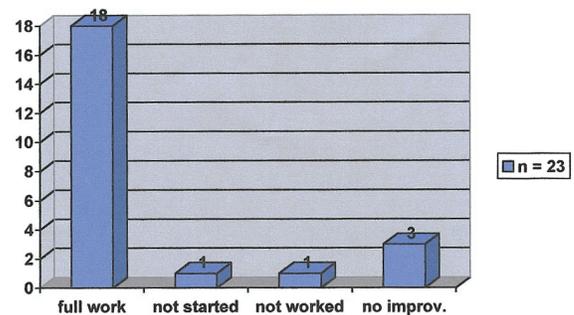


Fig. 4. Insertion desmopathy of the proximal suspensory ligament. Results of second follow-up lameness examination (6 months after treatment).

Right after the first treatment—when free of lameness—and in between the sessions, the horse got controlled exercise on firm ground.

Horses were walked in hand starting daily for 20 min in two different periods. Step by step these periods were increased up to 60 min walk. At the end of the treatment sessions, horses started a training program under the rider, beginning with 30 min walk interrupted by short periods of trot, for 4 weeks. After this, trotting was extended and the horses could gallop as well.

Results

As of March 2000, a total of 30 horses with chronic insertion desmopathy of the proximal suspensory ligament, which fulfilled the inclusion requirements, were treated with Radial Extracorporeal Shock Wave Therapy® (Fig. 6). The most important effect of successful therapy was improvement of the lameness related to pain reduction and early return to work. The final goal was a stable, lame free, permanent working capacity.

Before the first treatment the horses showed lameness in various degrees. As shown in Table 1, immediately after the first treatment 11 horses were already free of lameness. This demonstrates the strong, immediate pain reducing effect of ESWT therapy.

Looking at the more long term effects, we found at the time of the first follow-up that 16 of the treated horses were completely free of lameness and in 9 horses we noticed a distinct reduction of

pain. Five horses showed no pain reduction at all (Fig. 3). Six months after the last treatment, the time of the second follow-up examination (Fig. 4), 18 horses were already back to full work (training and competition), one horse improved, but did not start work yet, one horse did not return to work yet, and 3 horses showed no improvement (Fig. 5).

In 12 of the 15 horses which received ultrasonography examination we found ultrasonographic changes at the origin of the suspensory ligament. The most common changes were diffuse hypoechogenic areas, related to fluid accumulation and ruptured fibers. In 7 horses we found complete resolution of sonographic changes when these horses underwent a control examination. All these 7 horses were in the group with good results or did show a significant improvement of lameness. In one horse the defect was the same when rescanned and this horse was still lame. In another horse with initial hypoechogenic changes we could get a rescan of the tendon, but this horse became lame-free as well.

One horse with a central well-shaped hypoechogenic lesion in the proximal suspensory ligament, improved initially but then got worse again.

Discussion

The Radial Extracorporeal Shock Wave Therapy® for the treatment of chronic desmopathy of the proximal suspensory ligament in equine medicine, is a new, promising method. On longstanding lame horses the all over success rate we achieved was

Table 1. Insertion Desmopathy of the Proximal Suspensory Ligament. Effects on Lameness After Radial Extracorporeal Shock Wave Therapy® (Short Term Effects, n = 30)

| | Initial Examination | After Treatment 1 | After Treatment 2 | After Treatment 3 |
|---------------------|---------------------|-------------------|-------------------|-------------------|
| Index of lameness 0 | 0 | 11 | 18 | 24 |
| Index of lameness 1 | 7 | 9 | 7 | 3 |
| Index of lameness 2 | 9 | 7 | 2 | 1 |
| Index of lameness 3 | 14 | 3 | 3 | 2 |
| Total | 30 | | | |



Fig. 5. ESW therapy proximal suspensory ligament.

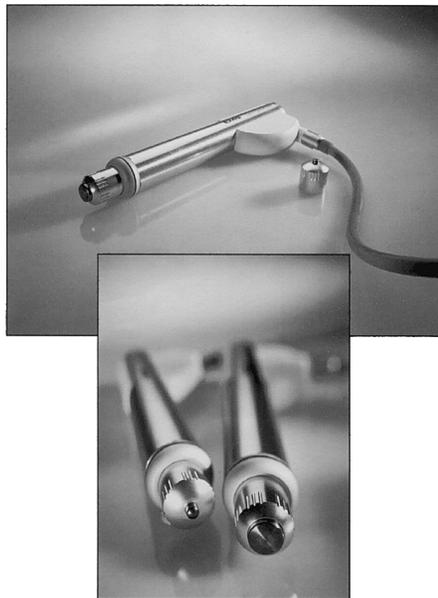


Fig. 6. Swiss DolorClast® Vet-Handpiece and applicators.

- Easy function principle
- User friendly design
- Flexible application
- Controlled application (Force indicator)
- Treatment specific application (6 and 15 mm diameter applicators)
- Autoclavable parts

22/30 horses (73.3%), and in this study 25 of 30 treated horses showed a reduction of pain. Comparing the number of lame-free and improved horses to a control group of horses ($n = 30$) suffering from chronic high suspensory desmitis which underwent conservative treatment, positive effect was significant ($p \leq 0.05$; Chi²-test). There was no statistical significant correlation comparing success rate to duration of lameness, radiological and sonographic changes.

We saw a correlation between success rate and sonographic findings (Table 2). In all 7 horses in the ESWT treatment group where we saw complete

sonographic resolution of the initial damage, all these horses were free of lameness and in full work 6 months after the final ESWT session.

As ESWT is a non-invasive method with no serious side effects (only temporary irritations of the skin such as swelling, which vanished the following days after the treatment) it is also an excellent alternative method. Additionally, the results show that radial shock waves are able to induce analgesia in the treated area and horses with lameness are able to go back into training spontaneously.

Table 2. Success Rate Compared to Sonographic Lesions Detected on Initial Lameness Examination

| Sonographic Diagnosis | No Findings | Hypoechogenic Zone | Core Lesion | Hyperechogenic Zone | Total Number |
|-----------------------|-------------|--------------------|-------------|---------------------|--------------|
| Success | | | | | |
| Good | 5 | 5 | — | 1 | 11 |
| Improved | — | 1 | — | — | 1 |
| Lame | — | 1 | — | — | 1 |
| Recurrent lame | 1 | — | 1 | — | 2 |
| | 6 | 7 | 1 | 1 | 15 |

Finally some advantages of this system include:

- The system is small, minimal in weight, easy to transport and to handle, so that it can be used in every stable where you have a power connection (no installation costs).
- With this system there is no need of working with a location finding system, like x-ray or ultrasound, because it is a radial shock wave system.
- High impulse frequency up to 10 Hz results in a short treatment duration.

Summary

Extracorporeal shock wave treatment enables equine practitioners to offer significant successful mobile treatment of lameness of chronic long-standing high suspensory desmitis. Radial Extracorporeal Shock Wave Therapy® is an excellent alternative noninvasive therapy for this condition. Immediate pain reduction led to early return to a convalescent training program. More research in this field might show further

standard indication for ESWT treatment in horses.

References and Footnotes

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^aSwiss DolorClast Vet® manufactured by EMS, Electro Medical Systems, Switzerland.

^bDomosedan, 1 ml containing 10.0 mg Detomidinhydrochlorid, Pfizer GmbH, D-Karlsruhe.

^cXylazin 2%, 1 ml containing 20 mg Xylazin, Medistar Arzneimittel-Vertrieb GmbH, D-Holzwickede.