

The fast wave

Treatment with radial shock waves only plays a marginal role in equine medicine. And yet modern technology goes full blast on ailing horses.

By Linda Krüger (published by Cavallo 03/14; translated by Storz Medical)

Thousands of shots batter down on the horse, hitting it wickedly with rattling noise. The animal briefly steps from one leg to the other, swishes its tail and then stands still. Everything is over and done in a few minutes. Treatment of horses with radial shock waves is loud, unpleasant and yet a good means to restore movement. Radial shock waves are the less known and often underestimated relatives of focused shock waves. The latter caused quite a stir in the 1980s when they were first used in human medicine to break down kidney stones with cracking energy but without surgery – a development that marked the birth of extracorporeal shock wave therapy, or briefly ESWT.

Shock wave impact on navicular syndrome

In the late 1990s, shock waves made their way into equine medicine. In 2000, CAVALLO reported about the astonishing success rates of initial studies conducted using shock waves to treat equine patients with navicular syndrome. Further studies confirmed that focused shock waves are an effective treatment for – above all – chronic diseases of the musculoskeletal system. Research and field experience have shown that the therapy is most successful in horses with suspensory ligament conditions. Many veterinarians consider radial shock waves to be much less effective than focused ones. This is despite the fact that in 2002 veterinary specialists at Telgte Equine Clinic and Hannover University of Veterinary Medicine, both in Germany, confirmed the good results achieved with radial shock waves in the treatment of typical suspensory ligament conditions. In fact, around 70 percent of equine patients suffering from chronic insertional desmopathy of the suspensory ligament



Christel Auer uses a special handpiece for use with the shock wave system to cause the horse's muscles to vibrate. This mechanical massage is intended to restore normal muscle tone.

origin were back in athletic shape for competitive sports six months after the therapy, compared to only 50 percent in the control group treated with a conventional regimen of local injections, rest and circulation-enhancing creams or ointments. The scepticism among veterinarians towards radial shock wave therapy is due to the technological differences between radial and focused waves. Focused shock waves contain more energy, penetrate deeper into the body and can be precisely targeted (i.e. focused) at the area to be treated – similarly to the foaming crest of an

ocean wave that breaks on a rock with maximum force, but with the difference that the veterinarian is able to control the wave and that the rock is, for example, the suspensory ligament at the horse's leg. By contrast, radial shock waves are not bundled upon their impact on the skin surface and spread radially through the tissue with continuously decreasing energy. Just like the ripples that form when you throw a pebble into water, which spread outwards and gradually lose force. So the logic behind this difference seems to be obvious: targeted waves are more effective. But is that really so?

Shock waves reach most target areas

„It is true that deeper structures such as the facet joints of the horse's spine can only be reached with focused shock waves,“ says Corry Ullrich, physiotherapist and product manager at Storz Medical in Switzerland, a specialist manufacturer of shock wave systems for human and veterinary medicine. However, most equine conditions doctors intend to treat with shock wave therapy are located close beneath the skin surface, which means they can just as easily be reached with radial shock waves. Modern radial shock wave systems have penetration depths of up to about 6 cm (with the highest energy concentration in the first 2 cm). By comparison: focused shock waves reach tissue penetration depths of almost 13 cm, with the energy having its peak at a depth of about 6.5 cm.

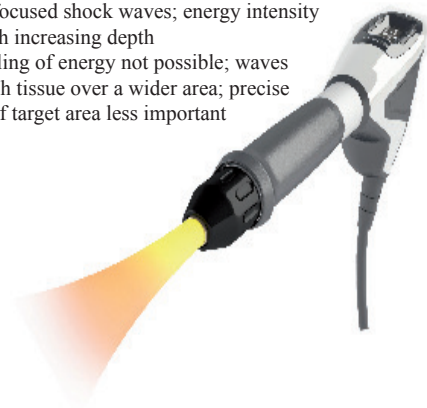


Focused shock waves

Acoustic sound wave with high energy density
Bundled energy focus deep in the tissue
Precise localization of target area required
 (by ultrasound or X-ray)

Radial shock waves

Ballistic pressure wave with low energy density; generated by compressed air
Maximum intensity at skin surface; hence more painful than focused shock waves; energy intensity decreases with increasing depth
Precise bundling of energy not possible; waves spread through tissue over a wider area; precise localization of target area less important



„Some veterinarians taking a critical stance towards radial shock waves may still have the old apparatus in mind, but obviously technology has improved significantly over the years,“ says Corry Ullrich, who uses radial shock wave therapy in her work as equine physiotherapist. „Depending on the clinical picture, the fact that radial waves propagate through the tissue may even be desirable because they reach adjacent structures.“ Today, there are even combined shock wave systems, enabling both focused and radial shock wave therapy to be performed according to the patient's specific requirements. The apparatus fits in a convenient carrying case so that therapists can easily transport it to any stable for treatment. This procedure is still quite unusual in equine medicine. Christel Auer from Singen in Southern Germany (www.equisiocare.de) is one of the few human and veterinary physiotherapists who unpack their transport case right in front of the stable box of their equine patients. She has been treating horses with radial shock waves for about two years. The shock wave handpiece she holds in her hand replaces her fingers, so to speak: „With my hands I apply pressure and tension to the tissue, and that is exactly what shock waves do, too.“ Only that shock waves do it faster – and louder. The shock wave handpiece looks and works almost like a pistol. A projectile located inside the handpiece is accelerated by compressed air and thrust forward at high speed with a bang. The violent impact of this ballistic pressure wave is transmitted to the horse's skin by means of a shock transmitter. The precise pressure and frequency of the shots depend on the

anatomical structures and pathology treated by the therapist. While 1500 shock waves may be sufficient for the nuchal ligament, up to 3500 waves may be necessary to treat the deep flexor tendon. Auer does not apply more than 4000 shock waves to either side of the horse. „The procedure is not a wellness experience. It actually hurts because I have to work on the pain regions,“ Christel Auer points out. In fact, radial shock waves – often praised as „gentle shock waves“ – are about three times as painful as focused ones. „This is because radial shock waves reach their energy peak directly on the skin surface when the projectile thrusts forward in the handpiece,“ Corry Ullrich explains. Nevertheless, Christel Auer has managed to treat all of her patients without sedation so far, i.e. without administering drugs to reduce irritability and agitation. She never starts treatment at full blast, but rather increases the energy level gradually. „I always keep a close watch on the horse in order to assess its response to pain – that guides me through the procedure.“ In addition to the shock wave system, the physiotherapist uses her fingers. While applying shock waves to a horse’s tensed back muscles, for exam-



Radial shock waves can also be used to treat suspensory ligament conditions, which are among the most frequent causes of lameness in dressage horses.

cles, for example, she palpates the muscles with her other hand. „In this manner, I can feel whether the tissue yields. The stimulus produced by the shock waves must not be too strong as this would put too much strain on the muscle.“ The treatment takes very little time: 2000 shots are fired off in about four minutes. „If one adds the five minutes it takes to prepare the system in the stable, the overall treatment time is about 20 minutes,“ Christel Auer explains. If she worked with her hands alone, it would take her about an hour longer. The fee per therapy session is around 80 euros, which means that treatment costs incurred by horse owners are within reasonable limits. Tendon problems, for example, generally require three to six treatments at weekly intervals. But, of course, the horse is far from being completely cured at the end of this treatment regimen. „It may take up to one year before the load-bearing capacity of the affected structures is fully restored,“ Auer points out. Lameness disappears much faster. The painful procedure has an analgesic effect. This may sound astonishing, but it is the result of biochemical processes that take place in the body such as the release of endorphins, known as ‚happy hormones‘. Nerve fibres are overstimulated and can no longer transmit pain signals directly. Moreover, shock waves also have an anti-inflammatory effect. In the long term, they induce a healing process whose precise mechanism of action has yet to be fully decoded.

Potential side effect: haematoma formation

What we do know for certain is that growth factors are released that enlarge blood vessels, enhance blood circulation and stimulate bone formation. „Therapeutic shock wave systems have an activating and reactivating effect, but they do not destroy structures as does a kidney stone lithotripter,“ Ullrich explains. There are only few contraindications to shock wave therapy (see below), and potential side effects are minimal: pain in the treated area may temporarily increase, the skin may redden or haematomas may form. Of course, shock waves – whether focused or radial – are no silver bullet for treating pathological conditions in equine medicine. And yet, radial shock wave therapy is

more effective than many veterinarians used to think. „It is a treatment modality I use from case to case, in combination with other procedures, and it provides good results,“ Christel Auer explains. „Still, as is the case with any other machine, the shock wave system is only as good as its operator.“ But how can riders identify a competent therapist? Auer recommends to consider the following criteria: Is he or she a certified physiotherapist and has he or she undergone medical training? How does the therapist handle the horse and is he or she responsive to the animal’s behaviour and reactions? „Think about whether you would be satisfied with his or her approach if you were the patient.“ Watch how the horse responds to the treatment: it should gradually relax. What’s more, a good therapist not only treats symptoms, but tries to identify the root causes of the condition. After all, permanently tensed back muscles that are the result of an ill-fitting saddle or a rider’s poor posture cannot be cured even with the fastest wave.



Christel Auer palpates the horse’s back muscles with her fingers to assess muscular response to shock wave therapy. Permanent muscle tension must be avoided.



„Any machine is only as good as its operator.“ Christel Auer, physiotherapist

Which wave for which condition?

Possible applications of shock waves in equine medicine

Indications for focused and radial shock waves:

- Muscular problems
- Tendon and ligament conditions (esp. insertional problems)
- Suspensory ligament conditions (esp. insertional desmopathy of the origin of the suspensory ligament and sesamoidosis)
- Fractures, e.g. splint bone fractures
- Nuchal ligament inflammation
- Bursitis
- Exostosis
- Osteoarthritis, e.g. ringbone or bone spavin
- Navicular syndrome
- Back pain (incl. kissing spine syndrome)

Indications for focused shock wave:

- Tendon/ligament conditions with calcifications
- Scars
- Facet joint problems
- Wound healing disorders

To avoid risks, shock waves should not be applied to tumours, to horses with coagulation disorders (including equine patients after cortisone therapy or administration of anticoagulants) or to mares in foal. Focused shock waves should not be applied over large nerves or hollow organs such as the lungs. Potential side effects include temporary increase in pain, haematomas and skin reddening.