Shock wave therapy

A promising and gentle therapy method for the treatment of orthopaedic disorders

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A new therapy form has recently gained increasing importance in the treatment of horses suffering from orthopaedic disorders. This therapy form is referred to as extracorporeal shock wave therapy or simply ESWT. The first reports dealing with extracorporeal shock wave therapy used in human medicine date back to 20 years ago when shock waves were first employed for the disintegration of kidney stones. Since then, ESWT has grown to become an invaluable treatment method in human medicine. Since the early 1990s, a modified form of extracorporeal shock wave therapy has been successfully employed to treat patients suffering from orthopaedic disorders such as heel spurs or shoulder calcification. Now, extracorporeal shock wave therapy is also making its entry into veterinary medicine.

Depending on the selected energy level, shock waves can be used in the treatment of bone tissue (stimulation of bone formation or removal of calcifications), of soft tissue sited close to bones (transition from bone/periosteum to tendon/fascia etc.) and in the therapy of chronic/acute pain (Table 1).

But what is the secret behind the success of extracorporeal shock wave therapy? Physically speaking, shock waves are highly intensive acoustic waves of very short duration. They are characterized by an abrupt pressure increase, an exponential pressure drop and a prolonged flat negative pressure period. These features distinguish them from the continuous waves employed in thermotherapy and from diagnostic ultrasound waves.

The therapeutic effect of shock waves can be attributed to the mechanical pressure and tension the wave exerts on the tissue. However, detailed knowledge on the (side) effects of shock waves on different types of tissue is not yet available.

Shock waves can be generated with various systems. These shock wave generators include spark gap systems, piezoelectric systems and the most frequently used electromagnetic shock wave systems.

The spark gap system, which works just like the spark plug of a vehicle, was the first shock wave generator used in human medicine and was employed for the disintegration of kidney stones as early as 20 years ago. Owing to the gradual wear of the shock wave source, however, this method of shock wave generation exhibits major pressure variations in the course of the therapy and involves substantial difficulties concerning a precise localization of the target area.
The development of electromagnetic shock wave systems has opened up new fields of application for extracorporeal shock wave therapy. Electromagnetic shock wave systems are characterized by the fact that the energy set free by an electromagnetic energy source is con-

verted into shock waves by an acoustic converter.

The shock wave is directly introduced into the body through a coupling cushion and focused on a specific point, the so-called focal point. The position of the focus is variable. In fact, it can be located in the tissue at a depth of up to 50 mm. It is only in the approximately 3x5 mm focus that the energy level of the shock waves is high enough to produce the desired therapeutic effect. The tissue surrounding the focus will not be damaged. In order to ensure precise focussing of the shock waves, it is crucial for the target area to be continuously monitored by means of an ultrasound unit throughout the therapy. This is due to the fact that even the slightest movement of the horse requires the direction in which the shock waves are triggered to be corrected. To this end, the cross hairs on the ultrasound monitor continuously indicate the position of the focus in the tissue to allow corrections to be made immediately, when necessary.

In equine medicine, extracorporeal shock wave therapy has so far been used to treat limb disorders. The best results have been achieved when using shock waves on therapy-resistant horses. In fact, pastern tendon lesions, in particular lesions affecting the tendon origin and tendon attachment, as well as lesions of the flexor tendon and sesamoid bone ligaments, tendon calcifications, arthrosis, osteoporosis of sesamoid bones and massive scar formation have all been treated successfully (Table 1). Obviously, the success of shock wave therapy is always conditional on a precise clinical, radiological and ultrasonographic diagnosis by the veterinary.

Depending on the type and severity of the disorder, one to three shock wave treatment sessions are performed at intervals of seven to 21 days. In order to achieve optimum therapy results, the equine patient is shaved in the therapy region and sedated. In-patient treatment is not required so that the horse can generally leave the clinic after the effect of the sedative injection has worn off. Also, strict rest in the box is generally not necessary. After completion of shock wave treatment, the horses undergo movement therapy tailored to their individual requirements.

To sum it up, it can be said that extracorporeal shock wave therapy is a promising new treatment method in equine medicine (Table 2).

Fields of application of shock wave therapy on horses/ponies

Treatment of bone tissue / soft tissue sited close to bones

- Insertion desmopathy (pastern tendon attachment)
- Adhesions in the area of the joint capsule/tendon/ligament attachment
- Calcifications of tendons/ligaments
- Arthrosis
- Osteoporosis of sesamoid bones
- etc.

(Table 1)

Benefits and drawbacks of shock wave therapy

Benefits of shock wave therapy	Drawbacks of shock wave therapy
• Proven success, even when treating animals with unfavourable prognosis • Old animals can be treated without having to go through severe strain • Outpatient treatment • Treatment can be performed with the horse standing • No surgery required • Cosmetic treatment	• Costs • Only recent results available (shock waves have been used on horses for only a year) • No panacea (only suitable for the treatment of specific disorders)

(Table 2)

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