Shock wave and pressure wave therapy
New hope for the treatment of equine tendon disorders

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A new therapy form for the treatment of equine orthopaedic disorders has gained increasing importance during the last three years. This therapy form is referred to as „extracorporeal shock wave therapy".

While initially different views were held on the use of this therapy, almost all major established clinics now consider extracorporeal shock wave therapy the number one choice for the treatment of certain diseases.

ESWT was first used over 20 years ago in human medicine for the disintegration of kidney stones. In the 1990s, it became the therapy widely resorted to in human orthopaedics for the treatment of shoulder calcifications and heel spurs and has recently made its entry in equine orthopaedics in a somewhat modified form.

In this context, one has to distinguish between classical extracorporeal shock wave therapy as it is performed with the MINILITH SL1 system developed by STORZ MEDICAL AG and the increasingly used unfocused pressure wave therapy by means of the MICROPULSOR MP1 system offered by the same manufacturer. In physical terms, the waves generated by the MINILITH SL1 are acoustic waves with extremely high intensity and very short duration. These are the distinctive properties of shock waves when compared to the continuous waves used for thermo-therapy or the sonographic ultrasound waves.

In order to generate these high-energy waves, classical shock wave therapy employs different types of generator systems: spark gap systems, which work like automotive spark plugs, piezoelectric systems and the most frequently used electromagnetic shock wave emitters which are characterized by the fact that the generated electric energy is converted into sound waves by means of electro-acoustic converters. By contrast, the energy of ballistic pressure waves is generated by means of a pulsating hammer operating at a given frequency.

During the last few years, both therapy forms have been tested internationally by STORZ MEDICAL AG, the leading manufacturer in this sector, and further developed to make them suitable for equine applications. The therapeutic results of both systems are provided by the mechanical pressure and tension effects exerted on the tissue by the waves. The classical therapy form features a coupling cushion employed to couple the sound waves to the patient's body and a focusing device designed to allow the waves to be focused on the desired target zone under continuous ultrasound control. The focus may be sited at a tissue depth of up to 50 mm and have a size of 2.4 mm x 25 mm (-6dB). An energy flux density (ED) of up to 1.49 mJoule/mm is reached in this region, which is equivalent to a pressure of about 800 bar, lasting a fraction of a second (measured with a glass fibre laser probe hydrophone according to the DGS Convention - German Society for Shock Wave Therapy).

The kinetic energy of the MICROPULSOR MP1 is applied to the patient's skin directly over the target area by an elastic shock imparted by means of a stamp. The pressure wave thus generated propagates radially inside the tissue, which means that no optically controlled focusing device is required. Owing to its compact and convenient size, the MICROPULSOR MP1 is also suitable for mobile use. Thanks to these convincing benefits, the MICROPULSOR MP1 is a cost-effective alternative or addition to an extracorporeal shock wave system.

When ballistic pressure waves are used, the generated energy is introduced into the tissue around the applicator contact area. This allows large target areas to be treated at the same time.

Both types of shock waves substantially increase the blood circulation in the tissue. This increases the oxygen content in the blood, while at the same time significantly reducing the carbon dioxide concentration in the tissue, an important factor with all types of tendon disorders. Throughout this process, newly formed fibres are aligned. Improved blood circulation and fibre alignment help to avoid adhesion of tendon fibres. Tendon calcifications can thus be

made more elastic. High energy allows defective tissue to be disintegrated, while low energy provides tissue regeneration by stimulating cell division. Areas that have shown to respond particularly well to shock waves are tendon attachments to bones. In these regions, limited periosteal reactions are induced which subsequently provide a stronger connection between the tendon attachment and the bone.

Excellent results have generally been achieved in the treatment of disorders of the pastern tendon origins and attachments of sesamoid bones. However, shock waves also provide a positive impact on the healing process of disorders affecting the superficial and deep flexor tendons or the suspensory ligament of the deep flexor tendon.

Osteoporotic changes of the sesamoid bones and, to a certain extent, disorders in the navicular bone region also respond well to pressure wave therapy.

Depending on the disorders to be treated, one to three treatment sessions are performed at intervals of about two weeks. During each treatment session, an average of 2000 shocks are applied to the target area at a selected energy level.

Crucial requirements for a successful therapy include a precise diagnosis before the therapy is actually started as well as careful follow-up treatment. Judging by the experience we have gathered in our equine surgery, the best results are achieved in the treatment of the ligament apparatus, provided that the treatment is repeated once or twice at intervals of two to three weeks and provided that suitable accompanying therapy is ensured.

Classical shock wave therapy as well as pressure wave technology will certainly gain a firm foothold in equine medicine in the years to come.

Further research into the therapeutic mode of action of extracorporeally induced energy applied specifically to equine patients has been commissioned by STORZ MEDICAL AG. These research projects examine histological changes on a cell level in the treated tissue and reactions of the bone skin.

Please do not hesitate to contact us should you require further system information.

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