

LIFE IS MOVEMENT: PHYSICAL THERAPY AS A NECESSARY TOOL IN EQUINE REHAB

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**Introduction**

Physical therapy or physiotherapy is a specialised paramedic support that is well known in human medicine and one that has gained its rightful place, and it is also becoming an increasingly important component of veterinary care ⁽¹⁾. Physical therapy can best be

described as “medical treatment of orthopaedic and neurological disorders, where exclusive use is made of natural forces such as light, water, electricity, heat, cold, massage and movement”. This definition is, in fact, very broad and covers almost everything that does not fall into the category of pharmaceutical or surgical medicine ⁽²⁾. Within physical therapy, three main disciplines can be distinguished: massage, movement therapy and the application of physical techniques. Of the three, massage is by far the oldest and most well known method, but movement therapy is now seen as the most important and effective discipline, and the one that offers the best veterinary possibilities, especially in the horse.

Massage

Massage was already being used in classical times, and still is a part of daily life in many cultures. Massage has a direct mechanical effect, but works also reflexively via the autonomic nervous system. Effects of massage can include: alleviation of pain, improved circulation, relaxation or otherwise activating the musculature and stimulating oedema resorption. In its general form, massage stimulates metabolism. On the basis of this effect, contraindications are easy to imagine: presence of fever, tumours, inflammation, and open wounds. There is a variety of massage techniques (variations in pressure direction, movement direction and intensity of pressure and movement, as well as frequency) with various indications. In humans, massage is still used, but is one of the least important components of physical therapy. In the horse it is not used very frequently, but it is common enough that clear guidelines have been published ⁽³⁾. Apart from the metabolic effects mentioned above, massage also has a relatively strong sedative effect in the horse.



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Movement therapy

“Life is movement, movement is life” is a well-known adage. Movement is, in fact, the product of the musculoskeletal system. The recovery of normal movement is the ultimate goal for the majority of physiotherapeutic (and orthopaedic) therapies. As such, movement therapy should be at the centre of physiotherapy. A differentiation can be made between passive movement therapy (where parts of the musculoskeletal system of the patient are moved), active therapy (the patient does the movements himself), and guided active therapy (the patient is stimulated to carry out certain movements, also without assistance) In animal physiotherapy, usually the latter form is used. A large number of stretching and pulling exercises have been described for the horse ⁽³⁾. Very often, the most important facet of these exercises is the enticement of the animal to make a movement that results in passive movement. Movement therapy can serve several goals such as: mobilising of joints, improvement of muscle function, stabilisation of joints through directed training of surrounding muscles (such as in lesions of tendons), influence on the muscle tone, and improvement of coordination. Movement therapy is, especially in the later phases of recovery, an important part of any physiotherapeutic protocol and adapted training. In professional sports, a separate job description exists in the form of recovery trainers, who take over from medical staff (doctors and physiotherapists). Only after treatment by these recovery trainers, the athletes are sent to the regular trainer. Because of this close connection of revalidation and intended use, it is important that veterinary physiotherapists (and treating veterinarians) have insight into these intended uses. They must have more than a superficial knowledge of the requirements of the specific disciplines wherein the animals will be used.

In some cases, it can be beneficial to allow movement to take place in a different environment than normal, especially water. In fact, a combination of hydrotherapy and movement therapy can facilitate movement, through upward motion (Archimedes principle). The swimming pools used for horses go from this principle. The water treadmills that have become popular more recently can be used for the same purpose, but are mostly used with relatively low water levels and act principally to increase resistance and therefore stimulate muscle action.

Contraindications for movement therapy can be disorders of the cardiovascular or respiratory system, weakening of bony structures such as with osteoporosis, and of course all disorders where rest of a traumatised body area is indicated.

Physical techniques

There are a number of different techniques that can be

categorised under the heading “physical techniques”. There is relatively little hard evidence that these techniques are effective, and therefore they are the topic of much discussion, both in human and veterinary physiotherapy. The lack of scientific evidence is mainly due to lack of research efforts, however, not to lack of potential merit of these techniques. Only in recent years more research into the clinical effects and working mechanisms is being initiated.

Hydrotherapy and thermotherapy

Hydrotherapy employs the external use of water, in the form of a bath or a shower (used by almost every horse rider after a ride to “cool down” the limbs). Because the temperature of the water can be varied, hydrotherapy always has a certain aspect of thermotherapy.

Cold has an analgesic effect. It is used in the form of ethyl chloride sprays for the local anaesthesia of small areas of the skin, for instance when opening an abscess. The application of cold also causes vasoconstriction, whereas heat leads to vasodilatation. This principle is used in the treatment of cases of chronic laminitis. The use of a solarium will increase temperature and blood flow in the back, and heat will have a stimulating effect on tissue metabolism as well.

Electric or magnetic field therapy

Since the discovery of the existence of various electromagnetic and radiation phenomena, people have been interested in their possible applications for healing various human ailments. However, also with regard to these therapy forms, little is known about the effects on the tissues or the working mechanisms. If research is done, expectations are not always honoured. It has been shown that the application of short-wave diathermy in equine tendon injuries has a very limited effect ⁽⁴⁾. A great variety of applications of electrical current in various forms exist: continuous, intermittent, AC/DC, etc. A number of these techniques are also used in treating the horse. Claimed effects include the induction of hyperaemia, alleviation of pain, influence on the autonomic nerve system and direct activation of nerves and muscles. A potentially interesting and relatively new technique is APS (Action Potential simulation) which, using very low current, acts upon the physiological currents that occur in depolarisation of cell membranes. Recent, preliminary studies showed that APS was able to stimulate the metabolism of equine tenocytes in culture, but current intensity had to fall within a relatively small window to have a beneficial effect ⁽⁵⁾. Cadaver and in vivo experiments have shown that electrode placement strongly influences current intensity, and thus is of great importance ⁽⁶⁾.

Laser therapy is also used, just as in human physiotherapy, as well as magnetic field therapy. The latter therapy,

which purported to have positive influence on bone metabolism, was the subject of much media interest. However, there is little evidence thus far that the great amounts of electromagnetic blankets and boots have contributed significantly to equine health and welfare.

Ultrasound

The application of ultrasound with a frequency in the 1 MHz range is one of the oldest and most extensively applied physiotherapeutic techniques. Therapeutic effects that are claimed include an increase of regenerative properties of tissues, improved circulation, reduction of pain, and a decrease in muscle tension. Ultrasound is mainly used in collagen-rich tissue (tendons, ligaments, cartilage and to a certain degree muscles), because these tissues have a high absorption rate of the energy conducted by ultrasound (7). This therapeutic application of ultrasound is different from the diagnostic application of ultrasound. In the latter application, frequencies between 5 and 10 MHz are used.

Extracorporeal Shock wave therapy (ESWT)

Extracorporeal shock wave therapy is a relatively new form of therapy that is based on the principle of the lithotripsy of kidney stones. Shockwaves are inducted into the tissue and cause a cavitation effect locally, which is followed by an implosion. Calcified tissues can be broken down by means of shock wave therapy, but scar tissue can also be decreased in order to offer an opportunity for better tissue recovery. Shockwave appliances produce either focussed or radial shockwaves. It seems that only the first has an actual working effect upon the architecture of the tissue. The second type, however, produces a definite analgesic effect that can last a reasonable amount of time. For this reason, the application of shockwave therapy in horses that are active participants in competition has been banned in certain countries as a form of doping.

There are several clinical reports on the benefits of shockwave therapy (8), but more fundamental work is scarce. In a recent study Bosch et al. (9) showed that focussed shock waves stimulated the metabolism of equine tenocytes at short notice (3 hours after application), but had a decreasing effect at the longer term (6 weeks after application).

Light therapy

Light therapy is the application of light with the shortest wavelength of the ultraviolet range (UV-C). This is primarily used in the treatments of wounds that are in the cicatrisation or epithelialisation stages. Ultraviolet light has a drying and bactericidal effect and advances epithelialisation. Although little fundamental research has been performed, there is clinical evidence as to the

effectiveness of treatment. Furthermore, this effectiveness is in line with the fact that this type of wound often heals better in horses that are allowed to walk outside, than in animals that are held in stables.

References

1. Bromiley MW *Physical therapy in equine veterinary medicine: useful or useless?* Proc. Am. Assoc. Equine Pract. 2000;46:94-97.
2. Bromiley MW. *Equine Injury, Therapy and Rehabilitation*. 2nd ed. Oxford: Blackwell Science: 1993.
3. Denoix JM and Pailloux JP. *Physical Therapy and Massage for the Horse*. 2nd ed. London: Manson: 2001.
4. Van Schie HTM, Cherdchutham W, Jonker M, van Schie MLJ, Bakker EM, DeGroot J, Moolenaar H, and van Weeren PR *Histomorphological and ultrastructural characteristics of tendon healing in the horse and the influence of short-wave diathermy*. In: *Ultrasonographic tissue characterization of equine superficial digital flexor tendon*. Thesis, Utrecht University, pp 167-196: 2004.
5. Lin YL, Moolenaar H, van Weeren PR and van de Lest CHA *Effect of micro current electrical tissue stimulation on equine tenocytes in culture*. Am. J. Vet. Res. 67:271-276: 2006
6. Lin YL, Moolenaar H, van Weeren PR and van de Lest CHA *Influence of electrode placement on effective field strength in the superficial digital flexor tendon of horses*. 2006. Am. J. Vet. Res. ;67:845-849.
7. Van de Windt DAWM, van der Heijden GJMG, van den Berg SGM, ter Riet G, de Winter AF and Bouter LM. *Effectiviteit van ultrageluid-behandeling voor aandoeningen van het bewegingsapparaat: een systematische review*. 1999 Ned. T. Fysiother;109:14-23.
8. Kersh KD, McClure SR, Van Sickle D and Evans RB. *Ultrasonographic evaluation of extracorporeal shock wave therapy on collagenase induced superficial digital flexor tendonitis*. 2006 Vet. Comp. Orthop. Traumatol;19:99-105.
9. Bosch G, Lin YL, Van Schie HTM, van de Lest CHA, Barneveld A and van Weeren PR *The effect of extracorporeal shock wave therapy on the biochemical composition and the metabolic activity of tenocytes in normal tendinous structures in ponies*. 2007 Equine Vet. J., in press.