Physical Therapy in Equine Veterinary Medicine: Useful or Useless?

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The machines and therapy methods used for the human athlete can, following diagnosis by a veterinarian, be utilized for the horse, to enhance recovery in carefully selected conditions. Author's address: Downs House Equine, Combeleigh, Wheddon Cross, Minehead TA 24 7AT, U.K.

Introduction

Physical therapy should not be considered as a 'cure all'; this premise, along with those attributed to other alternative therapies, is merely an unfortunate client misconception.

Physical therapists who wish to work in veterinary medicine in the U.K., and many other countries including Canada (but not yet in the U.S.), must have completed a recognized training protocol. The therapists are required to have trained at a recognized school of human physical therapy, completing a four-year in-depth course. Graduation in the U.K. allows the title, Member of the Chartered Society of Physical Therapists. Following successful graduation, a minimum of one year working in a human-based situation is required before the therapist is allowed by their governing body to apply to train as a veterinary physical therapist. This post graduate course requires weekend attendance, once a month, over a two-year period at the Royal Veterinary School (London). Successful completion allows these persons to become members of a subgroup of the main society, the Chartered Society of Physiotherapists. When working with an animal patient, they are answerable both to their governing body and to the referring Veterinary Surgeon, from whom both a diagnosis and permission for treatment must have been obtained.

Physical therapy has two distinct but integrated features. One concerns the use of an appropriate **machine** or therapy, employed at the appropriate stage of healing to assist tissue recovery, the second is concerned with re-education of movement, and is known as **rehabilitation.**

Cells are known to be capable of performing a functional reaction in response to weak electrical currents. It is this fact which gives rise to the many electrotherapy devices on offer. Physiotherapy might therefore be described as a form of 'electrical medicine'. Unfortunately, much of the equipment on offer for animal therapy is poorly researched. Suggestions in the accompanying literature is often not only unproven, but physiologically impossible.

Therapy

Physical therapy offered by unqualified persons is rarely useful and, unfortunately, irreversible changes can occur in the recipient should an inappropriate therapy be selected. An example is the use of therapeutic ultrasound for bucked shins.

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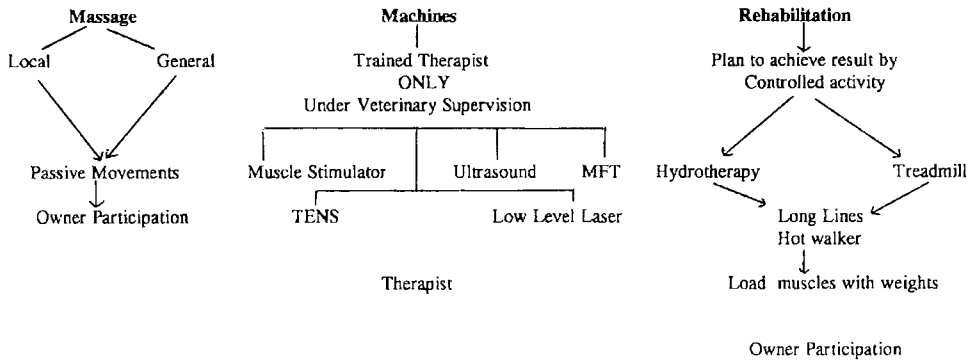

Fig. 1. This schema represents the different facets of physical therapy, when used as an adjunct to veterinary diagnosis and treatment.

Dyson[a] demonstrated bone recovery can be reversed following therapeutic ultrasound treatment. The Downs House Equine Rehabilitation Unit was opened in 1984 with the express purpose of attempting to transpose methods appropriate for the treatment of the humane athlete to the horse. The selection of therapy machines for use at the center was governed by the requirement that manufacturer's claims were backed by proven scientific facts, also that the units were both safe to use in a stable environment and easy for the therapist to transport. These requirements resulted in the purchase of a muscle stimulator, a therapeutic ultrasound, a low level laser, a Transcutaneous electrical nerve stimulation (TENS), and a magnetic field unit (the American blue boot).

The twenty-box unit was further equipped with an enclosed all-weather arena, a small treadmill (walk only), a solarium, a straight swimming pool, a cage walker, and sand boxes for turn out, enabling horses to roll freely.

Since 1984 approximately 2700 horses have been resident. To be accepted for admission each horse must have been referred by their veterinarian and must have had a blood test 24 hr before admission (this to ensure the horse was virus-free at the time of arrival and also for a muscle enzyme profile).

Admissions have covered a range of problems, including tendons of differing severity; various fracture cases, including pelvic, both complete and incomplete; wounds; muscle atrophy, in some cases secondary to neural involvement, in others, classed as disuse; loss of performance, no known cause. Horses treated are, in the majority, from the U.K. disciplines; TB animals from Flat National Hunt, and Arabian racing; from long distance, endurance, show jumping, polo, dressage, hunt horses, children's ponies, driving animals, and 3-day event animals. The average stay is 6 weeks.

70% of admissions have returned to their discipline and been successful, of the remaining 30%, approximately 10% were not appropriate for therapy, one example being a horse that had become trapped in a metal cattle grid. Sent for laser therapy, on admission it was noted that the anterior surface of the hind cannon (L) had been stripped of all tissue, including the periosteum, and that the underlying bone was necrotic. Spontaneous fracture of the cannon occurred three days after admission and the horse was euthanized. The remaining 20% have been unable, due to irreversible tissue changes, to return to previous performance levels, but after discharge have been able to continue to be used, at a lower level (Fig. 1).

Massage

Massage is claimed to assist venous return and promote relaxation. The hands of the therapist are molded to the contours of the body, the varied techniques employed in Swedish massage ensure pressure is directed, in parallel, to the blood flow within the main venous vessels. Rubbing is also claimed to releases body opiates, thus can possibly also reduce to a small degree local pain.

It is very important to consider pain and the possible necessity of pain to act as a guarding mechanism when selecting a therapy. The administration of chemicals can be utilized as a method of pain suppression, as given in sufficient quantity chemicals override the natural pain mechanisms of the body. There is no suggestion that massage has the same extended effect.

Magnetic Fields

All cells pose an electromagnetic potential across their membrane. The fields from static magnets are claimed to allow cells to stabilize following cellular damage secondary to tissue disruption. Electromagnets achieve deep heating, secondary to the cellular disturbance created by the polarity changes, created between the opposing magnets (diathermy).

Muscle Stimulators

In 1821 Faraday demonstrated that it was possible to achieve a muscle contraction by the delivery of an interrupted direct current. This apparatus deliv-

ered a very crude signal and the original faradic apparatus has been replaced by far more sophisticated methods. Scientists working in the Department of Soft Tissue Repair, Guys Hospital, London, U.K. have designed an electrical signal which is closer to the cortical command required to activate muscle contraction than that created by Faraday.

This has resulted in the development of the Trophic Muscle Stimulator, making it possible for a therapist to stimulate agonist and antagonist muscles, a single muscle or complementary muscle groups following muscle atrophy.

Case History Illustrating the Use of a Muscle Stimulator

Fracture of the accessory carpal bone had resulted in the horse standing with the injured knee in slight flexion while on three months box rest. When exercise resumed the horse was unable to move normally, walking with the affected knee held in slight flexion, caused by contraction of the flexor muscles. Treatment, using a muscle stimulator on the extensor muscles achieved reciprocal relaxation in the flexor group. The contracture stretched sufficiently over a six-week period to allow a return to normal ambulation.

Low Level Lasers

Low level lasers are permissible for use in the stimulation of tissue recovery in the U.K. and in Europe. The exact physiological effects of their mechanism is not fully understood but it is considered that selected bands in the spectrum of light influence nerve conduction. Low level lasers are claimed to be effective as a method of stimulating acupuncture points. Field studies have suggested their use has the ability to enhance wound closure. Work currently undertaken in both Israel and Japan on the human model suggest the use of low level lasers, programmed in carefully selected wave bands, enhances nerve conduction following neural compression.

Therapeutic Ultrasound

The sound wave delivered to tissues, via the transducer head, produces oscillation of the cells in the path of the ultrasonic beam. Secondary to this oscillation there occurs an increase in the metabolic activity of the cells lying within and immediately adjacent to the passage of the sound wave. Treatment enhances the reabsorption of exudate following tissue breakdown and can be used to maintain mobility in a hematoma, reducing the risk of the formation of scar tissue. The dangers associated with this form of treatment are an unacceptable temperature rise within the target area, and/or collapse of cells leading to deep tissue necrosis. In trained hands the therapy can be extremely beneficial.

TENS

Transcutaneous electrical nerve stimulation was developed and has been used to relieve pain in the human patient since Wyke wrote his treatise on pain. Numerous versions of the stimulator have been designed, given equi friendly names in the U.K. and are purchased and used by owners for pain control, both for themselves and for their horses. The question must always be 'is the pain required'? An example from an international competition illustrates this point. The horse in question was representing its nation at a show jumping event. A person selling a type of TENS informed the rider a treatment would improve an undoubtedly 'stiff hock' action hind (L). Treatment was given. The horse went to jump. It was obvious from the expression on the rider's face that things had improved. Unfortunately at the fourth fence, the hamstring group of muscles, working as never before due to the removal of the 'guarding pain', previously present within the hock, ruptured.

As with all therapy machines, success will only occur following the selection of appropriate cases.

Rehabilitation

Rehabilitation is concerned with the restoration of normal, economic ambulation in the subject following accidental injury, surgery, or disease. The human subject works, under voice direction, in a gymnasium or in an appropriate simulated environment. The equine athlete necessitates a more subtle approach, the apparatus for re-education includes the use of applied weights to load muscle, the tread mill, the swimming pool, the cage horse walker and work in an arena, in long lines.

Swimming

The horse is not a natural swimmer and great care must be taken because the horse is unable to breathe efficiently and the activity is nearly always anaerobic. The Downs House pool is a straight pool, the horses walking down a ramp, swimming through the pool and existing at its far end, they are then walked up and down beside the pool until their heart rate has returned to normal. One swim through the pool (30 sec) against the underwater jets employed raises the heart rate to 200 beats per minute. Horses should not be swum if they only use their front legs, if they only use their hind legs, or if they appear to kick to one side or the other, this because their body mass is suspended and if they do not swim in a coordinated manner, they may do themselves more harm than good.

The uses of a pool are to maintain condition and to build certain of the muscle groups of the back. It is not a method of training so much as an aid to the retention of cardiovascular fitness.

The Treadmill

Treadmills have been largely used in veterinary research establishments but have gradually become available to horse trainers. The main problem with the treadmill is that the moving belt takes the limbs artificially into retraction, in the case of the fore-

limb, and protraction in the case of the hind limb, thus the horse is only using one set of muscles in the working limb. This leads to an imbalance of muscle groups, and while the treadmill is useful to build the muscles of the loins, horses that are worked for too long on a treadmill become very thick over the shoulders using the trapezius as a method of elevating the shoulder blade to achieve protraction of the forelimb. The greatest advantage of the treadmill is to teach a horse to move in an even cadence following injury. After a spell of incorrect ambulation the cortex accepts the incorrect movement as normal and it is difficult when the injury has been addressed to persuade the animal to go back to the correct balanced ambulatory pattern. On a treadmill, because of the moving belt, it is difficult for the horse to put in a short step. Field work at Downs House has demonstrated that work on a treadmill for approximately five minutes a day will achieve a normal pre-injury cadence after five days.

The Mechanical Walker

The walker used at Downs House is designed in a manner that the horse is free in a cage. The horses are divided one from the other by paddles, both in front of them and behind them, these paddles suspended from metal arms. The paddles are rotated by an electrical motor and the speed can be adjusted from a slow to brisk walk. In cases where there is a weakness in one limb, the muscles of the limb are loaded by the application of a weighted boot, the boots look exactly like a brushing boot but the padding has been replaced with lead, each weighs approximately 2 kilos. The reason for the use of the weighted boot being that it is impossible to increase muscle power without loading the muscles. Another method of loading the muscles is to increase the weight of the shoe of the weaker limb. All horses at Downs House spend a period of each day on the walker.

The Outdoor School

Horses are worked in the outdoor school wearing the harness that would be used for breaking them in. This consists of a snaffle bridle with two side reins attached to a roller, a cavesson with two lines rather than a single lunge line, ensuring that the person working the horse is able to control the quarters with the outside line. The work required in the school mirrors that used by the classical schools of Europe in their breaking process, the horses being worked at varying paces of both walk and trot with the addition of work over poles which may be flat on the ground or raised.

Case History

A horse was admitted with intermittent lameness of the right hind leg, the horse having been previously scanned to eliminate any possibility of skeletal damage.

On arrival it was noted that the horse had atrophy of the hamstring group of the right hind and tended to move with a shortened stride of that hind limb. When viewed in the school the horse was able to circle to the right but found it very difficult to work to the left, giving an appearance of mild lameness when asked to do so.

The daily routine was as follows:

1. Stimulation of the muscle group involved using a muscle stimulator.
2. 15 minutes on the walker wearing a weighted boot.
3. Swimming to maintain cardiovascular fitness.
4. Work in the school at middle trot to achieve activity in the hind limbs.

The average case remains at Downs House for between four and six weeks and then returns to owner or trainer, able to return to its pre-injury training regime. Machine therapy on its own is far from satisfactory and if it is possible to incorporate a rehabilitation program at the same time as the use of machines, the result will be far superior to the "machine only" cases.

The veterinary profession is beginning to accept the aid of technicians, people who are professionals in their own right, lab technicians, equine dentists, and radiographers. I suggest physiotherapy has something to offer: the services of a qualified therapist with the ability to enhance recovery following injury in the equine athlete. With cooperation, and following a diagnosis made by a veterinary surgeon, physical therapy ought to become a useful adjunct to veterinary medicine, but this can only occur if the varied therapies are administered by a qualified person, correctly trained in the use of therapy apparatus, and who also possesses an in-depth knowledge of the physical demands of the individual equine disciplines.

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[a] Soft Tissue Research Unit, Guys Hospital London UK.