Jul 12th, 11:00 AM - 11:20 AM

Equine Rehabilitation

Steve Adair
sadair@utk.edu

Introduction to Equine Rehabilitation Modalities

Steve Adair MS, DVM, DACVS, DACVSMR, CERP
Director Equine Performance Medicine and Rehabilitation Center

1. Cold Salt Water Hydrotherapy
    a. Water is maintained between 2 and 4º C, to minimize heat and inflammation. This provides analgesic pain management as well as inhibiting enzyme degeneration of tendons post injury. The salt solution acts as a hypertonic poultice as well as having a natural healing effect on wounds. Water aeration has a massaging effect on the leg and increases the dissolved oxygen content of the solution. The depth of the water is proportional to the pressure exerted on the leg which aids fluid and waste dispersal; this can be varied according to position and severity of the injury. With water hygiene levels continually being maintained with a combination of fine filtration, chlorination, cold water and salt, the unit allows thousands of successive treatments. These same factors not only prevent further micro-biological infections but actually help treat any pre-existing conditions. As water gets colder its ability to carry oxygen increases and with the unit also being aerated, the oxygen content is increased dramatically.
2. Electrical Stimulation
    a. Electrical stimulators are available in many shapes and sizes but they all have one common purpose, to stimulate tissue for a therapeutic response. The most common use of Electrical stimulators is in the relief of acute or chronic pain. The use of Transcutaneous Electrical Nerve Stimulation (TENS) provides the capability of stimulating comfortable muscle contraction and can induce muscle fibers in spasm to relax. This technique is also used to stimulate skin or bone growth when tissue repair is needed as it hastens the regenerative process in wounds and acts as a bactericide. The effects of electrical stimulation on muscle strength and size are also beneficial and it can be used in horses that have sustained muscle atrophy after injury. Other similar modalities are referred to as Functional Electrical Stimulation (FES) as well as Muscle Stem. All relieve pain through a mechanism referred to as Gate Theory pain conduction suppression, and also have the capacity at higher doses to create muscle contracture stimulation. Also used to counteract muscle atrophy.
3. Hyperbaric Oxygen
    a. The human literature is vast in this area and much supportive data has been generated from laboratory animals. However, at this juncture, there is little data obtained from scientifically controlled studies to validate or repudiate this therapeutic modality in horses. The list of conditions which hyperbaric's have been anecdotally reported to be therapeutic include: stress fractures, rhabdomyolysis, laminitis, dorsal metacarpal periostitis, wound healing, immune function, and shock. This treatment modality has many advantages that make it very applicable to horses. It is totally non-invasive, can be applied to multiple conditions, it relatively simple to administer, and can be combined with other forms of therapy i.e. stem cell, shock wave, and controlled exercise. The obvious disadvantage is that hyperbaric chambers are not universally available.
4. Hyperthermia
    a. Heat increases the blood flow and relaxes tissue, decreasing muscle spasms and related pain. The increase in the local circulation is beneficial to the tissue in order to enhance oxygenation, re-absorption of edema, and mobilizing tissue metabolites that increase healing. This therapy is indicated for injuries that are more chronic and when the acute onset inflammation is no longer present. It can also provide better joint and tendon mobility by application before stretching. Heat therapy is most effective when tissue temperatures are raised up to 104° to 113° F. Superficial heat as a modality is more commonly applied with hot packs and hydrotherapy. Research has revealed that skin and subcutaneous tissue increase their temperature to therapeutic levels in 6 minutes; however, deeper tissues such as tendons and muscle requires 15-30 minutes to achieve effective therapeutic levels.
5. Therapeutic Lasers

a. Sometimes also known as “Photo Therapy”, the therapeutic effects are similar to what is observed in acupuncture treatment. Lasers have the advantage of not requiring the placement of needles, and are also more forgiving in terms of where the laser is actually applied. Studies in horses have shown pain relief, as well as documented positive effects on wound healing.

6. Shockwave
    a. Extracorporeal Shock Wave Therapy (ESWT) is very beneficial for the treatment of soft tissue and bone injuries. This modality provides high pressure, short duration shock wave that stimulates tissue healing. ESWT has been proven to have great success in the treatment of multiple pathologies in the horse such as navicular disease, arthritis, back pain, incomplete sesamoid fractures, stress cortical fractures, tendonitis and desmopathy such as in the origin or insertion of the suspensory ligaments. The use of Shock Wave therapy in horses usually requires sedation of the patient and the treatment takes about 10-15 minutes to be performed. The ESWR protocol will vary depending on the severity of the injury and how it responds to the initial treatment. Most horses require 1-4 treatments separated by one to three weeks until healing improvement can be observed.
7. Solarium
    a. Consists of several therapeutic Infrared Lamps emitting warmth and heat waves - promoting health and performance; strengthens vital functions and the immune system. The rays of heat penetrate into the muscular tissue and tendons and help stimulate the blood circulation thus resulting in quicker healing time after injuries. Speeds up drying time after exercise and bathing. Enhanced natural production of vitamin D3. Faster decomposition of lactic acid and enhanced metabolism
8. Therapeutic Exercise
    a. Many different types are available. Range from hand walking to riding. Usually used to address specific injuries such as hill work for strengthening quadriceps to treat intermittent upward fixation of patella. Can be used to improve proprioception following neurologic disease
9. Total Body Vibration
    a. Recently these devices, that create a massage sensation when applied externally, have entered into some rehabilitation programs. The mechanism of pain relief is reportedly the same as is produced by massage, and increases in circulation are also claimed. To date no scientific studies have been performed that support such claims. Has been used in humans to improve bone density
10. Therapeutic Ultrasound
    a. Ultrasound is a form of acoustic energy used to treat musculoskeletal injuries, including inflammation and wounds. It offers deep heating without excessive heating of the skin. Ultrasound can also be used to decrease pain and muscle spasm, promote wound healing, aid re-absorption of hematoma, reduce swelling, and reduce scar tissue. It increases blood flow in the area treated. It increases cell membrane permeability to ions and other substances. It blocks signal transmission in nerves. It decreases muscle spasms. It has been shown in clinical and scientific trials to increase collagen extensibility, enhance collagen remodeling, enhance collagen production, increase heat in deep tissues, increase blood flow, increase range of motion, reduce pain and muscle spasm, and accelerate wound healing.
11. Underwater Treadmill
    a. Systems may be used for treating injuries such as bowed tendons, pulled suspensory ligaments, bucked shins, and saucer fractures, quarter cracks or foot problems and generally for the rehabilitation of the animal after any injury or surgery. The lungs and heart of the animal receive maximum conditioning, which increases their capacity thus minimizing possibility of bleeding while performing. Bones become denser and more compact and the tendency of the periosteum of the cannon bones becoming inflamed is greatly reduced and can be virtually eliminated with the aid of a treadmill. Properly controlled exercise in the treadmill adds significant tone and conditioning to the back and stifle muscles and would make ‘tying up’ during the early stages of training less apt to occur. Early conditioning on treadmill systems helps tendons, ligaments and joint capsules to tighten and increase in tensile strength and thus prepares a horse for the heavier training required to prepare the animal for the race track or equestrian shows.

Condition	Cold Salt Hydrotherapy	EStim	HBOT	Hyperthermia	Laser	ShockWave	Solarium	Therapeutic Exercise	Total Body Vibration	Ultrasound	UW Treadmill
Arthritis				X	X	X		X	?		X
Back Soreness		X		X	X	X	X	X		X	
Bucked Shins	X				X	X			X		X
Bursitis					X					X	
Cellutitis	X	X	X								
Colic Recovery			X		X (incisional)						
Hoof Injuries	X								X		
Acute Laminitis	X		X								
Chonic Laminitis	X		X						?		
Tendon & Ligament Damage	X	X	X		X	X		X	X	X	X
Lower Limb Infections	X		X								
Lower Limb Inflammation	X		X		X						
Muscle Atrophy		X						X			X
Muscle Strains					X	X		X	?	X	
Neurologic Disease		X	X					X			X
Conditioning								X	X		X
Post-Surgery Recovery			X		X			X	?		X
Scar Tissue Adhesions				X		X		X		X	X
Skin Infections	X		X								
Stifle Injuries					X			X	?		?
Wounds	X		X		X	X				X	