Laser Therapy in Equine Practice

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I have witnessed therapeutic lasers being used on the equine athlete since the 1970s. The lasers that were used throughout the 70s, 80s, and 90s were all Class III lasers and were always: “long on promises but very short on clinical results”. There was some anecdotal evidence of benefit to wound healing but almost no scientific studies supporting any other clinical applications.

Failure of these earlier therapeutic lasers was primarily due to a lack of power (Wattage), improper wavelengths, and the insufficient application of a therapeutic dosage (Joules/cm²). The lack of successful treatment utilizing photobiomodulation changed with the innovative technology developing within the industry. Research has now provided an effective therapeutic modality. Class IV therapeutic lasers have now become an essential tool in modern equine practice.

What does the application of a deep-penetrating therapeutic laser actually accomplish?

Through a stimulated photobiochemical cascade of events at the cellular level, there is a relief of pain, a reduction in inflammation and an increase in microcirculation. These three events result in an accelerated restoration of function or healing within the tissues.

A localized and systemic analgesic effect is accomplished through several simultaneous biochemical pathways. These are:

• Increased nitric oxide production
• Increase in the release beta endorphins
• Decreased bradykinin levels within the surrounding tissues
• Ion channel normalization within the individual cells
• Stabilization of the action potentials within the individual nerve cells
• An increase in the localized and systemic serotonin levels
• Increased release of acetylcholine
• Blocked depolarization of C-fiber afferent nerves

Reduction in the inflammatory process is accomplished by a similar cascade of events. These are:
• An inhibition in the synthesis and secretion of inflammatory prostaglandins yet a stimulation of those prostaglandins that have a vasodilatory and anti-inflammatory action.
• Stabilization of the cellular membrane in regards to Ca$^{++}$, Na$^{+}$ and K$^{+}$ concentrations.
• Enhancement of ATP production and synthesis stimulating the metabolic activity and the production of fibroblasts
• Reduction in interleukin 1 production

Microcirculation is primarily stimulated by the release of Nitric Oxide and increased levels of serotonin. This increase in circulation and subsequent vasodilatation allows for an increase in leukocytic and macrophage activities.

What are the top clinical applications for deep penetrating laser therapy?

There are four broad areas where photobiomodulation is of great benefit to the equine athlete. These are:

1. Accelerate the rehabilitation and healing of many common lameness disorders.
2. Maintain the peak performance within any equine athletic discipline.
3. Prevent the occurrence or recurrence of athletic injuries.
4. As an essential component of stem cell and PRP treatment protocols.

Combining deep-penetrating laser therapy with traditional therapeutic regimens accelerates the recovery time of many common lameness disorders. Pharmacological approaches and rehabilitative physical therapy techniques such as hyperbaric oxygen therapy and underwater treadmills complement each other to reach the unique therapeutic goal for each patient. Several of the most common applications of laser therapy for the treatment of lameness disorders include:

• Tendon and suspensory injuries such as tears, tendonitis and desmitis
• Synovitis and tenosynovitis
• Degenerative joint disease
• Osteoarthritis
• Back disorders
An eight-year-old Warmblood jumper was presented with an acute lameness of the RF limb. This lesion was diagnosed in the RF superficial digital flexor tendon. The total cross-sectional area of the lesion was 1.24 cm² and the core lesion area was .28 cm².
Laser therapy was applied to this anatomical area at a rate of 10 J/cm² every 48 hours for four treatments and then every 72 hours for an additional four treatments. Therapy was then applied bi-weekly until April 25th 2007. There was a total of 15 laser therapy sessions. The leg was placed through passive range of motion exercises during each administration.

In addition to the laser therapy, NSAIDs were administered systemically the first 48 hours and then discontinued. The exercise schedule was as follows:

The first ten days: ROM exercises and stall rest.
Day ten to day 14: ROM exercises during the application of the laser combined with hand walking 20 to 30 minutes twice per day.
Day 14 to April 25th: ROM exercises during the application of the laser and hand walking was done at increasing intervals.
April 25th, 2007

On April 25th the ultrasonographic appearance of the tendon was substantially improved with the defect being filled and the fiber pattern normalized. Note the lack of any scar tissue present.

After this 45 day recheck, laser therapy was continued once per week for another two weeks and the hand walking was increased by 10 minutes twice per day. On May 7th, the animal returned to light flat work. Laser therapy was applied immediately after the first work and once per week thereafter. On May 21st the animal resumed light jumping at low levels over the next two weeks. On June 23rd the animal competed at 1.5 m and placed. Total recovery time 14 weeks.

This is a study of n1 but illustrates the accelerated speed of healing the application of laser therapy allows.

One of the most important aspects of equine sports medicine includes the maintenance of these athletes at their highest level of performance. Deep-tissue laser therapy is an invaluable tool for this endeavor. All athletes have to endure the rigors of training. This training results in pain and soreness. Periodic therapeutic laser applications allow these equine athletes to recover faster and therefore train more efficiently.

The ability to use laser therapy to prevent injuries is often overlooked or even considered non-efficacious. How important would it be to establish blood flow and elasticity within the tissues of the suspensory tendon, in an equine athlete that
is predisposed to stress in this anatomical area, before a competitive event? Deep-penetrating laser therapy accomplishes this therapeutic goal.

An analogy to this application is currently being used by athletic trainers. A high percentage of Major League Baseball pitchers are having a therapy session applied to both their shoulders and elbows before their scheduled start. This preventive application technique has allowed them to warm up more efficiently and perform at a higher level. After the game, these same pitchers receive additional treatment to allow them to recover faster and stay in the starting rotation.

**How often do you have to apply laser therapy for it to be effective?**

Laser therapy is cumulative in effect. Each treatment is complementary to the last on a cellular level. Each case is unique and a therapeutic goal should be established setting realistic expectations for the owner or trainer.

If the condition is acute, i.e. soft tissue injury or wound, or chronic, high suspensory desmitis, treatment is accomplished in three phases. Initially, the therapy should be administered in an aggressive nature. Every day or every other day for several treatments. This is analogous to the loading dose of a pharmacological agent. A high level of stimulation within the tissue is the first goal. Secondly, there is a transition phase which consists of twice per week or once per week as dictated on a case-by-case basis. Lastly, especially in chronic disorders, a maintenance phase should be in place. This allows the therapeutic goal to be maintained.

**What are the important facts when choosing a therapy laser for equine practice?**

Choosing the right therapeutic laser is important when you consider the patient is more often than not over 1000 pounds. This patient may also have dark pigmented skin, a fairly thick hair coat and massive muscle tissue to penetrate. The following parameters are the most important to consider:

1. Power: The more Watts, the more versatile its applications and the faster the treatments can be accomplished.
2. Wavelength: It is a scientific fact that the higher the wavelength, the greater the depth of penetration.
3. Warranty: Where is the laser made? What is covered and how soon can I get a replacement if broken?
4. Engineering: Will the laser emit continuously for a long period of time?
5. Training: Will someone be available that knows Equine applications and what is practical in the equine practice?

In these tough economic times, how do I get a return on my investment?

One of the Golden Rules of practice is: Don’t buy anything that can’t pay for itself in one year. Incorporating laser therapy into your practice has a very short learning curve and within very short period of time it will be utilized in numerous areas of your practice. Charges vary with respect to geographic region but the following charges represent a nationwide average:

<table>
<thead>
<tr>
<th>Anatomical area</th>
<th>Average treatment time in minutes</th>
<th>Average Charge In Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpus</td>
<td>6 - 8</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Fetlock</td>
<td>5 - 6</td>
<td>25 - 30</td>
</tr>
<tr>
<td>Foot</td>
<td>6 - 8</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Back</td>
<td>25 – 30</td>
<td>125 - 175</td>
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<tr>
<td>Stifle</td>
<td>8 - 10</td>
<td>40 - 50</td>
</tr>
<tr>
<td>Hock</td>
<td>6 - 8</td>
<td>30 - 40</td>
</tr>
</tbody>
</table>

To summarize this financial model:

Dx: Carpitis in both knees. Traditional standard of care therapy plus:
Rx; Each will receive 6 laser treatments:

6 treatments X two anatomical areas X $30.00 = $360.00
Total time spent doing each treatment = 12 – 15 minutes

Summary:
• Laser therapy provides a relief of pain, a reduction in inflammation and accelerated healing.
• Laser therapy is a scientifically proven healing modality.
• Laser therapy brings another tool to your practice for disorders we currently don’t have a solution for i.e. chronic sore backs
• Laser therapy brings another income source to the practice without cannibalizing any other aspect of the practice

Proper administration of photobiomodulation is the equine therapy of the future. As we discover more applications it will give us more therapeutic solutions and provide a better quality of life for our equine athletes.