Patient Selection for Regenerative Laser Therapy

Horses referred for treatment with the RLT laser must be thoroughly evaluated to avoid over or undertreating. Since it is common for lameness, limb soreness and soft tissue injuries to be caused by asymmetrical weight bearing due to pain from the cervical vertebrae, back, pelvis, diagonal or contralateral limb abnormalities, etc., a remote cause for any injury should be ruled out. Thorough clinical examinations are necessary and other diagnostic modalities, especially scintigraphy should be used if a remote cause for the injury is suspected. Treating a distal extremity injury with the laser that is caused by a remote cause is fruitless since the injury most likely will recur if the primary problem is not found and also treated.

In addition to signalment (age, sex, breed) the use of the horse needs to be considered. The time of injury onset and degree of lameness should be recorded. The amount of pain on palpation and response to any limb flexion needs to be noted. Treatment settings are adjusted for the level of pain and whether or not the image is recent or chronic.

Ancillary treatment with a game ready device to help remove swelling is indicated. No anti-inflammatory treatment with corticosteroids, NSAIDs or other medication should be given unless there is significant pain to warrant it.

Scanning protocols:

Lesion documentation should be performed initially to determine if the injury is treatable with the PLT. This should include all necessary imaging modalities to accurately document the injury. After therapy, a recheck with the same modalities should be repeated. Because tissues will continue to remodel after the therapy. Images should repeated after one month of handwalking.

Tendons:

The areas of interest should be clipped closely. Both superficial digital flexor tendons should be scanned with ultrasound and compared. Scans should include the medial and lateral branches of the SDF in the pastern level if indicated. The Images should be marked right or left, fore or hind and the level of the image should be marked with the "zone" method 1A, 1B, 2A, etc. or the distance from the accessory carpal bone (DACB) or tuber calcaneous (DTC) in centimeters. The cross-sectional area (CSA) of the tendons should be determined for each level. Images should be made in cross section and long axis. If there is a focal lesion, multiple long axis images should be made of the lesion and adjacent tendon to evaluate fiber alignment. Video clips should be stored to perform 3D evaluation of the fiber pattern and extended views (e.g. GE Logiq view) of the tendon should be made if this technology is available. Cross beam imaging should be turned off when video clips are saved for 3D evaluation. Lateral or medial tendon lesions should also be imaged directly from the medial and lateral aspects over the lesion in sagittal and cross section planes. This is important to evaluate any adhesions that may be formed to adjacent structures, especially the inferior check ligament.

Off axis views of the tendon should be performed to document intratendonous fibrosis. This is done by directing the sound beam at an angle either proximally or distally which causes parallel fibers to appear echolucent and random fibrosis and/or fiber misalignment to appear echogenic compared to the parallel fibers. If core lesions are present, the intact tendon CSA should be measured and compared to the contralateral tendon at the same level or to average reported normal values if both tendons are

affected. Since the size of the hematoma in the tendon core is variable, its CSA doesn't need to be measured. Hind SDF tendon images should be labeled starting with Z1A and B in the plantar tarsus area. Zone 2A is at the level of the suspensory ligament origin

This basic method can be used for deep digital flexor tendon injuries.

Suspensory ligaments:

Both suspensory ligaments should be examined sonographically. They are labeled the same as the tendon distally to the bifurcation (Zone 3A); Off axis scans to define both lobes of origin should be made. Off axis scans of the ligament body should be made to document the fibrosis and/or misaligned fibers. Fluid within the ligament will be echolucent regardless of beam direction.

The branches need to be scanned individually from medial and lateral approaches. They should be labeled Proximal (at the distal splint) level; mid and distal including long axis and cross section views. Long axis views of the branch insertions on the abaxial sesamoid bone surfaces should be made.

Measuring the branches can be done in two ways: Cross sectional area (CSA) or 2 diameters; proximal to distal and abaxial to axial at 90 degrees to each other. Branches with chronic injury are often elliptical in shape. Off axis scans are important for branch injuries to document intraligamentous and periligamentous fibrosis. Areas of fibrosis will remain echogenic in off axis. They can be done weight bearing by directing the beam off axis distally or proximally

Hind suspensory ligament origins should be labeled Zone 2A. Distal zones should be labeled Zones 2B, 3A, etc. ending with Zone 4A at the bifurcation. The suspensory branches should be labeled the same as the forelimb.

Miscellaneous Soft Tissue Injuries:

The above methods of labeling the anatomy are standard. Other anatomic areas of injury that are scanned should be properly labeled as to allow interpretation by other reviewers. For example, "RF fetlock lateral coll ligament". Unlabeled images are confusing and do not allow accurate assessment.

Alternative Imaging Modalities:

Other imaging modalities, including MRI, scintigraphy, X-Ray, CT, thermography, etc. should be used to document injuries to accurately assess the degree and location of injury.

Imaging Archive:

Images and video clips should be archived in a raw DICOM format.