HOW TO IMPLEMENT REHABILITATION STRATEGIES IN YOUR SPORT HORSE PRACTICE

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REHABILITATION CONTRIBUTES MORE THAN
50% OF THE SUCCESS OF
“RETURN TO NORMAL FUNCTION”
OR
NEAR NORMAL FUNCTION

THERE WILL ALWAYS BE BASIC PROTOCOLS FOR
THE CONDITIONS WE ATTEND IN VETERINARY MEDICINE,
BUT I TRY TO AVOID “COOKIE CUTTER” TREATMENT OR REHABILITATION

TAILOR TO THE INDIVIDUAL
IMPORTANT CONSIDERATIONS

WHOLE HORSE EXAMINATION

GENERAL PHYSICAL EXAMINATION

CARDIOVASCULAR

RESPIRATORY

DIGESTIVE

AXIAL

APPENDICULAR

MUSCULOSKELETAL

HISTORY

TREATMENT OF WHOLE HORSE

PRIMARY EXAMPLE: MANY RACEHORSES WITH FORELIMB TENDON, LIGAMENT, AND JOINT ISSUES HAVE HINDEND/AXIAL SKELETAL ISSUES. THEY UNLESS TREATED, WILL RECUR.

IMPORTANT CONSIDERATIONS

WEIGHT CONTROL

METABOLIC FUNCTION

NUTRITION/DIET
IMPORTANT CONSIDERATIONS
HOOF CARE/SHOEING

SHOES REMOVED FOR AQUATREAD
- NOT NEEDED (DECREASED STRESSES AND NO SIGNIFICANT GFR)
- ALLOW FEET TO RECOVER AND GROW AND EXPAND, UNINHIBITED
- "THRUSH" AND "WHITE LINE DISEASE"

SHOES NEEDED FOR TRANSITIONING:
- SURFACE DEPENDANT
- BIOMECHANICAL SHOE TAILORED TO SPECIFIC INJURY (IE. COLLATERAL SHOE)
- GFR NOW COMES INTO PLAY

REHABILITATION

CENTERPOINT OF REHABILITATION
- CONTROLLED EXERCISE

REHABILITATION
SPECIFICALLY CONTROLLED EXERCISE

TENDON AND LIGAMENT INJURY HEALING REQUIRE MECHANICAL STIMULI
BONE DENSITY ALSO DEPENDANT ON LIMB LOADING
AIDS IN WEIGHT CONTROL DURING TIME OFF
MUSCLE FITNESS DECREASES SUSCEPTIBILITY TO REINJURY
UNCONTROLLED EXERCISE

- HANDWALKING
- LONGEING
- TURNOUT

MY PRIMARY CONTROLLED EXERCISE TOOL
UNDERWATER TREADMILL THERAPY

- Buoyancy decreases load on limbs
- Significantly improved postural stability
- More symmetrical muscle recruitment
- Resistance (viscosity) of water increases level of work (direct resistance of water + increased by jets)
- Straight line work decreases torque
- Behavior control during exercise
- Experienced users identify symmetry/asymmetry of movement
- Compliance factor removed

UNDERWATER TREADMILL THERAPY
VARIABLES TO CONSIDER

- Depth
- Temperature
- Salt content
- Duration
- Intensity
- Treadmill speed
- Added current
UNDERWATER TREADMILL THERAPY
DEPTH
- Buoyancy increases with depth
  Pelvic depth: 75% reduction in weight
  Elbow depth: 10-15% reduction in weight
- Depth as depth increases
  Stride length increases
  Stride frequency decreases
- Depth has variable effects on range of motion of various joints
  Carpal range of motion greatest in hock depth water
  Hock range of motion greatest in stifle depth water
  Fetlock flexion greatest in hock depth water
  Fetlock extension greatest in fetlock depth water

WHY NOT SWIMMING??
Great conditioning technique for fitness with a few negatives
(15 minutes similar to hand-galloping 5 miles)
- Need leg loading to maintain density of connective tissue
  (Emphasis ends up as cardiovascular and respiratory)
- Arch neck to breathe while swimming, which hollows back and compresses spine
- Rely heavily on hind limbs to propel through water, which can worsen hindend lameness issues

AQUATREAD VERSUS AQUAPACER
AQUATREAD VERSUS AQUAPACER

- Aquapacer requires more training to device and typically more sedation
- Aquapacer has very mild inhibition of motion compared to Aquatread
- Aquapacer causes exaggerated motion during filling process

Both:
- Require proper training to the device by experienced handlers
- Require assessment of fitness prior to starting program

To date since 2008 we have rehabilitated 1322 horses in an Aquatread

- Tendon injuries
- Ligament injuries
- Post arthroscopic surgery
- Management of osteoarthritis
- Foot injuries
- "Fat Camp"
- Intermittent training (alternate with regular training)

Evidence Based Support

Underwater treadmill exercise significantly improved postural stability

Mechanical and histologic evaluation of the effects of underwater treadmill exercise on horses with experimentally induced carpal joint osteoarthritis.
TRANSITIONING

- VERY IMPORTANT PART OF ANY REHABILITATION PROGRAM
- DECISION TOOLS MAKE THIS PART EASIER (SERIAL ULTRASOUND, RADIOGRAPHS, ADVANCED IMAGING, AND/OR CLINICAL EXAMINATIONS)
- ADDING "EQUICISER" EXERCISE FOR ASYMMETRIC OR COLLATERAL INJURY (VARY % R & L)
- BEHAVIOR MODIFICATION (RESERPINE, TRANQUILIZERS FOR RIDER/PATIENT SAFETY)
- GRADUATED TURNOUT
- TRANSITIONING TO WORK UNDER TACK TAILORED TO INDIVIDUAL

TRANSITIONING

MUSCLES USED DIFFERENTLY DURING UNDERWATER TREADMILL EXERCISE EG:
- QUADRICEPS IN ANTERIOR THIGH ACCELERATE LIMB IN DIRECTION OF MOVEMENT WORKING IN AN EXAGGERATED FASHION
- HAMSTRING MUSCLES IN CAUDAL THIGH NORMALLY ACT ECCENTRICALLY TO DECELERATE LIMB BEFORE IT HITS THE GROUND ARE MINIMALLY ACTIVATED
- THEREFORE, WATER BASED EXERCISE UNLIKELY TO TRAIN MUSCLES IN THE SAME WAY AND WE MUST TRANSITION TO GROUND EXERCISE.

SPECIFIC THERAPY ROUTINES

INTERSPINOUS LIGAMENT DESMOTOMY (ISLD)

START PREOPERATIVELY - PROSPECTIVE PATIENT IN PESSOA TRAINING 2-3 WEEKS PRIOR TO SX

POST SURGICALLY:
- NEXT DAY: 30 MINUTES HANDWALKING 2X DAILY FOR 3 WEEKS (+ STALL REST)
- AT 3 WEEKS: 10 MINUTES DAILY LONGEING WITH PESSOA RIG (INCREASE 5 MINUTES PER WEEK) (+ SMALL Paddock TURNOUT)
- AT 7 WEEKS: RIDING CAN BEGIN

CORE STRENGTHENING EXERCISES FOR THE LIFE OF THE HORSE
- EQUIBAND SYSTEM FROM www.equinecoreconcepts.com
- EXERCISES FROM BOOK "ACTIVATE YOUR HORSE’S CORE"

*PAY CLOSE ATTENTION TO SADDLE FIT AS RIDING IS RESUMED AND TOPLINE REDEVELOPS
PESSOA

EQUIBAND SYSTEM
CORE MUSCLES: MOBILIZE AND STABILIZE HORSE'S BACK

STIMULATE SKIN RECEPTORS ACTIVATING THE FOLLOWING MUSCLE GROUPS:
- Abdominal
- Epaxial
- Hypaxial
- Cervical

RAISE AND ROUND THE BACK AND ENGAGE HINDQUARTERS ALLOWING "PROPER" WORK, REDUCING RISK OF PAIN AND INJURY

SYSTEM IS CONSTRUCTED WITH:
- Saddlepad (available in several sizes)
- 2 lengths Equibands attach to saddlepad with clips

EQUIBAND SYSTEM

Pole work and gymnastic jumping with the Equiband system
DYNAMIC MOBILIZATION

EVIDENCE BASED SUPPORT

Dynamic mobilization exercises increase cross-sectional area of musculus multifidus. Authors N. C. STUBBS, J. KAISER, J. HAUPTMAN, and H. M. CLAYTON. EVE, 15 March 2011

In people with back pain, deep spinal stabilizer (multifidus) inhibited (ipsilaterally, causing atrophy, asymmetry, and vertebral instability. Specific exercises required to reactivate multifidus. This study assesses effect of dynamic mobilization on size and symmetry of the equine thoracic and lumbar spine.

Eight horses received mobilization (flexion, extension, and lateral bending L and R (5 repetitions/exercise/day on 5 days/week for 3 months and not ridden). L and R multifidus CSA measured at 6 spinal levels and found increase multifidus CSA significantly at all 6 levels and reduced muscle asymmetry at final evaluation.

ELECTROPHYSICAL THERAPIES

- TENS
- LASER
- VERAPAMIL THERAPY
- PEMF (MAGNIVA VE)
- FES/NMES
- TENS
ELECTRICAL STIMULATION FOR SKELETAL MUSCLE

TENS (TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION):
LOW FREQUENCY (2-10 Hz (Pulses/second)) - TARGETS SENSORY FIBER TO OVERIDE PAIN IMPULSES, DOES NOT ACTIVATE MOTOR FIBERS.

NMES (NEUROMUSCULAR ELECTRICAL STIMULATION):
HIGHER FREQUENCIES (20-50 Hz) - USED FOR RE-EDUCATING THE NEUROMUSCULAR SYSTEM, RELAXING MUSCLE SPASMS, PREVENTING MUSCLE ATROPHY, INCREASING BLOOD CIRCULATION, AND MAINTAINING OR INCREASING RANGE OF MOTION

FES (FUNCTIONAL ELECTRICAL STIMULATION):
PAIRING NMES STIMULATION WITH A FUNCTIONAL TASK

EQUINE VERSION-EQUINEW FES

EQUINE FES “EQUINEW”

ELECTRICAL STIMULATION FOR SKELETAL MUSCLE

EVIDENCE BASED SUPPORT

2017 Vol. 63 / AAEP PROCEEDINGS

Functional Electrical Stimulation (FES) and the Effect on Equine Multifidi Asymmetry
Diane Isbell, DVM; Sheila Schils, MS, PhD*; Suzan Oakley, DVM, DACVSMR; and Ugo Carraro, MD

ULTRASOUND EVALUATION OF CSA OF EQUINE MULTIFIDUS MUSCLES PRE AND POST FES TRAINING COMPARED WITH CONTROLS OBTAINED FOR 12 HORSES SHOWING SIGNIFICANT IMPROVEMENT IN SYMMETRY OF MULTIFIDUS AFTER 8 WEEKS COMPARED TO CHANGE IN CONTROLS

Eur J Transl Myol / Basic Appl Myol 2015; 25 (3): 145-182

Mitochondrial density and distribution by histochemical approaches distinguish muscle Giber types and support clinical improvements due to FES as a treatment of equine epaxial muscle spasms Barbara Ravara, Valerio Gobbo, Ugo Carraro, Lin Gelbmann, Jamie Pribyl, Sheila Schils

GRADING MUSCLE SPASMS FOUND A ONE GRADE IMPROVEMENT AFTER 4 FES TREATMENTS INDICATING IMPROVED FUNCTIONAL MOVEMENT OF THE SACRAL/LUMBAR REGION
PEMF (PULSED ELECTRO-MAGNETIC FIELD THERAPY):
PURPORTS TO IMPROVE PAIN AND MUSCLE FUNCTION BY PROMOTING
CELL METABOLISM

INCONCLUSIVE

Therapeutic effects of whole-body devices applying pulsed electromagnetic fields (PEMF): a systematic
literature review.  

THERAPEUTIC USE OF PEMF DEVICES CANNOT BE RECOMMENDED WITHOUT
MORE SCIENTIFIC EVIDENCE

NO STATISTICAL DIFFERENCES BETWEEN GROUPS

LASER THERAPY
“LIGHT AMPLIFICATION BY STIMULATED EMISSION
OF RADIATION”

- COLD LASER ORIGINALLY USED TO DISTINGUISH THERAPEUTIC FROM SURGICAL
- SINGLE MOST IMPORTANT FACTOR DETERMINING EFFECTIVENESS OF LASER
  THERAPY IS POWER OUTPUT (MEASURED IN MILLIWATTS (mW))
  - DEPTH OF PENETRATION: HIGHER POWER= DEEPER PENETRATION
  - TREATMENT TIME: HIGHER POWER= SHORTER TREATMENT TIMES
  - THERAPEUTIC EFFECT: HIGHER POWER= MORE EFFECTIVE TREATMENT

ONLY CLASS IIIb AND CLASS IV LASERS DEMONSTRATE HEALTH BENEFITS

CLASS IIIb (ALSO CALLED “COLD LASER” OR “LOW LEVEL LIGHT THERAPY” (LLLT):
- POWER OUTPUT: 25-500 mW
- DEPTH OF PENETRATION: LESS THAN 0.5 cm
- EXTENDED TREATMENT TIMES (OFTEN 1-2 HOURS)
- LIMITED TO CONDITIONS OF SKIN OR JUST BELOW SKIN

CLASS IV (HIGH POWER LASERS)
- POWER OUTPUT: 500-12,000 mW
- DEPTH OF PENETRATION: 3-4 cm
- TREATMENT TIMES SIGNIFICANTLY REDUCED (OFTEN 5-15 MINUTES)
Short and long term outcome of high power laser therapy as a treatment for tendinopathy in 150 sport horses. 

**MATHILDE PLUIM ET AL; TIERKLINIK LUSCHE BAKUM GERMANY**


High-intensity versus low-level laser therapy in the treatment of patients with knee osteoarthritis: a randomized controlled trial. Kheshie AR, Alayat MS, Ali MM.

**FOUR DIFFERENT PATHOLOGY GROUPS (SDFT, DDFT, PSL, SUSP BR) TREATED WITH HIGH POWER LASER. THESE INITIAL RESULTS SHOWED SIGNIFICANT IMPROVEMENT IN LAMENESS DEGREE AND ULTRASONOGRAPHIC APPEARANCE INTENSE TREATED WITH THE LASER. SIX MONTH FOLLOWUP AVAILABLE ON 64 HORSES SHOWED IMPROVEMENT IN RE-INJURY RATES. ACUTE LESIONS RESPONDED BETTER THAN CHRONIC AND LAYER ONLY TREATMENTS SHOWED BETTER RESULTS THAN LASER COMBINED WITH OTHER TREATMENTS. FURTHER STUDY NEEDED.**

**RANDOMIZED CONTROLLED STUDY 53 MALE PATIENTS WITH KNEE OSTEOARTHRITIS COMPARED HILT + EXERCISE, VS LLLT + EXERCISE, VS PLACEBO LASER + EXERCISE AND EVALUATED FOR SCORE COMBINING PAIN, STIFFNESS, AND FUNCTION. RESULTS SHOWED HILT AND LLLT - EXERCISE WERE MORE EFFECTIVE TREATMENT THAN EXERCISE ALONE AND HILT MORE EFFECTIVE THAN LLLT.**

**THERAPEUTIC ULTRASOUND**

ULTRASOUND WAVE IS BIPHASIC AND HAS A PEAK PRESSURE OF 0.5 BAR. SHOCKWAVES ARE UNIPHASIC WITH PEAK PRESSURE AS HIGH AS 500 BAR, APPROXIMATELY 1000 TIMES THAT OF AN ULTRASOUND WAVE.

A review of therapeutic ultrasound effectiveness studies. Robertson VJ, Baker KG.

**EVIDENCE BASED SUPPORT**

THIRTY FIVE CONTROLLED TRIALS BETWEEN 1975 AND 1999 WERE SCRUTINIZED FOR PATIENT OUTCOMES AND THERE WAS LITTLE EVIDENCE THAT ACTIVE THERAPEUTIC ULTRASOUND IS MORE EFFECTIVE THEN PLACEBO ULTRASOUND FOR TREATING PEOPLE WITH PAIN OR FOR PROMOTING SOFT TISSUE HEALING IN A RANGE OF MUSCULOSKELETAL INJURIES.

**EXTRACORPOREAL SHOCKWAVE THERAPY**

ULTRASOUND WAVE IS BIPHASIC AND HAS A PEAK PRESSURE OF 0.5 BAR. SHOCKWAVES ARE UNIPHASIC WITH PEAK PRESSURE AS HIGH AS 500 BAR, APPROXIMATELY 1000 TIMES THAT OF AN ULTRASOUND WAVE.

ESWT INDUCES NEOVASCULARIZATION AND GROWTH FACTOR UPREGULATION, IMPROVING BLOOD SUPPLY AND TISSUE REGENERATION.

ESWT HAS BEEN PROVEN AS EFFECTIVE AND SAFE NONINVASIVE TREATMENT OPTION FOR A VARIETY OF MUSCULOSKELETAL PATHOLOGIES (TENDINOPATHIES, INSERTIONAL TENDINOPATHIES, NON-UNION FRACTURES, ETC.) IN A MULTITUDE OF HIGH QUALITY RCTS.
THERAPY COMBINING EXTRACORPOREAL SHOCKWAVE THERAPY AND PRP
EVIDENCE BASED SUPPORT

SHOWED THAT APPLICATION OF ESWT TO PRP INCREASES EXPRESSION OF GROWTH FACTORS (SPECIFICALLY TGF-β1 AND PDGF-ββ) IN VITRO
SUGGESTS THAT COMBINATION OF PRP AND ESWT MIGHT RESULT IN SYNERGISM OF THE MODALITIES, STIMULATING RELEASE OF GROWTH FACTORS FROM PLATELETS AFTER BEING INJECTED INTO AN AREA OF INJURY

ELECTROPHYSICAL THERAPY
VIBRATION PLATE
EVIDENCE BASED SUPPORT

Effects of Whole Body Vibration on the Horse: Actual Vibration, Muscle Activity, and Warm-up Effect
Heinz Hans Florian Buchner, Lisa Zimmer, Louisa Haase, Justin Perrier, Christian Peham
Journal of Equine Veterinary Science 51 (2017) 54–60

ANECDOTAL: ONE OF MY DRESSAGE TRAINER CLIENTS PREFERS POST EXERCISE BETTER RECOVERY??

VIBRATION PLATE
EVIDENCE BASED SUPPORT

Long-term and immediate effects of whole body vibration on thoracolumbar imbalances in the horse: A pilot study
Bart Tom Halsberghe*Peninsula Equine Medical Center, Menlo Park, CA Journal of Equine Veterinary Science 48 (2017) 121–128

WHY USED TO IMPROVE STRENGTH AND SIZE OF PARASPINAL MUSCLES AS WELL. ACTIVATION OF MULTIFIDUS PLAYS A KEY ROLE. ACTIVE FUNCTION AND SYMMETRY IN Horses. STUDY SHOWED SIGNIFICANT INCREASE IN MULTIFIDUS CSA AT ALL SPINAL LEVELS AFTER 30 AND 60 DAYS WBV AND A SIGNIFICANT IMPROVEMENT IN MULTIFIDUS SYMMETRY AFTER 60 DAYS WBV.
NON-EXERCISE HYDROTHERAPY (SPA)

SIDE NOTE: FROM COLD WATER THERAPY HAS BEEN BORN "DYNAMIC THERMOGRAPHY"

DORSAL HEAT THERAPY

HEAT

- Increases blood flow
- Reduces stiffness
- Reduces muscle spasms
- Relieves pain

CASE STUDIES
HISTORY

6/10/13: SUSTAINED ACCESSORY CARPAL BONE FRACTURE JUMPING FROM PASTURE
6/10/13: FULL LIMB PVC SPLINT APPLIED OVER A ROBERT JONES BANDAGE

HISTORY

8/29/13: REMOVED FROM SPLINT
REHABILITATION
MULTITIERED APPROACH STARTED SEPTEMBER 2013

- RANGE OF MOTION EXERCISES (3-5X DAILY FOR 6 WEEKS)
- SALT WATER SPA (WARM WATER ONCE DAILY FOR 6 WEEKS)
- AQUATREAD CONTROLLED EXERCISE (20 MIN. DAILY THRU MARCH 2014)
- TRANSITION TO AQUATREAD + EQUICISER (ADDED 15 MIN DAILY 3/1/14)
- TRANSITION TO TURNOUT + TRAINING UNDER TACK AT HOME FARM

SERIAL IMAGING

SERIAL CLINICAL
SOUND AT ALL GATES AND RETURN TO NORMAL RANGE OF MOTION
FOLLOWUP
4/12/2015 FIRST SANCTIONED START IN MY LADY'S MANOR ALLOWANCE-SECOND
SINCE ACB FRACTURE, AS OF NOVEMBER 2017, 11 SANCTIONED STARTS WITH
6 WINS AND 2 SECONDS (EARNINGS $217,000)

Pennsylvania Hunt Cup 2016
Race 3
The Pennsylvania Hunt Cup
4 Miles over Timber

ROSSI
8 YO
WARMBLOOD
DRESSAGE
GELDING

HISTORY
- 3/25/17: INITIAL VETERINARY EXAMINATION MISDIAGNOSED AS A DDFT INJURY IN DISTAL PLANTAR METATARSAL REGION. APPARENTLY DRAINED DTS DISTENSION AND PERFORMED 3 SESSIONS ESWT
- 5/15/17: STARTED TURNOUT-CAME IN FROM FIELD 4/5 LAME WITH 6/5 DISTENSION OF DTS
- 6/14/17: CALLED OUT FOR SECOND OPINION-NO CHANGE FROM 5/15 SONOGRAPHIC SURVEY DTS REGION REVEALED SEVERE TEAR OF MANNICA FLEXORUM, TENDONITIS OF SDFT FIBROCARTILAGE
- 6/20/17: REFERRED FOR SURGICAL REMOVAL OF MANNICA FLEXORUM, TRANSECTION OF PLANTAR ANNULAR LIGAMENT, AND DEBRIDEMENT OF THE SDFT
REHABILITATION
MULTITIERED APPROACH STARTED 7/5/17
- RANGE OF MOTION EXERCISES (2X DAILY FOR 4 WEEKS)
- HIGH POWERED REGENERATIVE/ANTI-INFLAMMATORY LASER (10S/1 MO)
- SALT WATER SPA (COLD WATER ONCE DAILY FOR 4 WEEKS)
- AQUATREAD CONTROLLED EXERCISE (20 MIN. DAILY THRU 9/21/17)
- INTRASYNOVIAL PRP ON 5/26/17 AND AGAIN ON 9/15/17
- TRANSITION TO AQUATREAD + EQUICISER (ADDED 15 MIN DAILY 9/1/17)
- TRANSITION TO TURNOUT + TRAINING UNDER TACK AT HOME FARM (RESERpine USED DURING THIS TRANSITION)