Returning the Injured Athlete To Sports
Complex Multiphase Rehabilitation Program
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Soft Tissue Differential Diagnosis – Etiology of Pain?
Program Specific to the Athlete and Sport
Secondary to Overuse-Trauma-Immobilization –

* Understanding Normal Physiology & Pathophysiology
* Limits of Mobility
* Muscle Imbalances
* Balance Deficits
* Abnormal Movement Patterns
* Gait Deviations & Foot Mechanics
* Energy Systems Deficits – Nutritional needs of the Athlete

Assessment of Four Systems

1-Passive System
Joint restrictions capsular limitations – Instabilities

2-Active System
Muscle imbalances
tight vs. weakness
Type 1 – Type 2A – Type 2X Muscle Fiber Types

3-Neuromuscular –
Balance in the Athlete
-Vision
-Vestibular
-Somatosensory

4-Energy System
Anaerobic/Aerobic Endurance

Necessary and Destructive Dynamic Rotational Movement Patterns

- Core Muscles initiate and attenuate forces generated by the rotational movement patterns of athletic performance
Core
Trunk-Pelvis-Glenohumeral-Scapular-Thoracic

- Lumbar-Pelvic-Hip Complex
- Location of the centre of gravity
- 35 Muscles that attach to the pelvic complex
- Humeral-Scapular-Thoracic/Ribs Complex 20 Muscles
- Muscles designed for movement and stability in a delicate balance
- Athletic acceleration, deceleration, & dynamic stability within the Core
- Enhance Performance

Passive System Rehabilitation
Getting Ride of Pain Increases Performance

**Phase One**
  - Plastic deformation of Connective Tissue
  - Oscillations, Low Load Prolonged, Manipulation
  - End Range working into the barrier
- Joint Pain – modalities
  - LASER/Micro currents (Adam 1)
- Joint Instability
  - Surgery
  - Bracing, Taping
  - Foot Orthotics

Should Manual Therapy be Specific?
Italy International Manual Therapy Congress 2010
Subscapularis Syndrome – Specificity of Rx

- External Rotation – Limited Elevation
- Lack of Disassociation humerus and scapula
- Increased external rotation – increased elevation

Helping the Patient Heal Without Causing More Trauma

- Adam I - micro currents
- Lymphocytes, fibroblasts and macrophages have been found to follow gradients in electric fields, a process called electrotaxis

An applied electric field with strength within the physiologic range can induce directional cell migration (i.e. electrotaxis) of epithelial cells, endothelial cells, fibroblasts, and neutrophils suggesting a potential role in cell positioning during wound healing.

Burn – Treatment with new device – micro current

Note the change in wound bed color after only 2 hours of treatment

A decrease in the area of slough in proximal wound after 1st Tx
- Eschar is a slough or piece of dead tissue that is cast off from the surface of the skin
Slough completely gone after 5 Rx’s in 5 days

4th treatment 5th treatment

9th Rx Good red granulation tissue present Wound size reduced 50% after 12Rx

Distal wound fully closed, proximal wound bed now separated into two smaller areas. 17th Rx 21st treatment proximal wound 95% closed – 6 weeks total treatment time.

The patient returned to gymnastics the day after the last treatment no joint restrictions or pain.

The Healing Effects of Light Energy
LASER Light Amplification by Stimulated Emission of Radiation

What is Laser Therapy?

- Photobiostimulation
  - Distal of chemical reactions is triggered by light exposure to light
  - Light changes the reduction/oxidation status of the mitochondria leading to enhanced ATP synthesis Krebs Cycle
  - Actuation of Sodium/potassium pump alters the cell membrane permeability to the flow of Calcium

• Photobiostimulation

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Super Pulse Laser – Multi-Radiance Medical
In the Treatment of Muscle T.P.

- Z. KIRALP Comparison of low intensity laser therapy and trigger point injection in the management of myofascial pain syndrome
  The Pain Clinic, Vol. 18, No. 1 (2006)
  There was no difference in the relief of pain when comparing Laser to Trigger point injections (6 month FU)
  VAS, Verbal pain scale, pressure gage

- Super pulsing produces higher peak power leading to higher energy densities (more photons delivered) without thermal buildup in cells and tissues
- Speeds up the transformation of photons into biochemical energy and encourages depth of penetration up to 5 inches

Treatment of Sports Hernia and Subscapularis Trigger Points

Custom Foot Orthotics to Support Foot Function
Strength and Endurance Rehabilitation
Are we Creating Muscle Imbalances?

Phase Two
- Reduce muscle imbalances (Tight vs. Weak)
- Eccentric
  - Increase strength of tendons/ligaments
  - Protective effect – sarcomeres in series
  - Max force - Greater EMG
- OKC – Muscle Hypertrophy
- CKC – Co-contractions
- Isometric – co-contraction
  spinal stabilization

Eccentric decline squat superior results at 12 months compared with traditional eccentric protocol for patellar tendinopathy in volleyball players. Young Br J Sports Med 2005

Eccentron Decline Squat


- Tendon injuries account for 30-50% of injuries in sports
- Chronic problems from overuse of tendons result in
  - 30% of all running-related injuries, & elbow tendon injuries as high as 40% in tennis players.
- Patellar tendinopathy is reported to be as high as 32% and 45% in basketball and volleyball players, respectively.
Eccentric Loading Is Healing to Tendon and Ligament

- Oxygen consumption is seven and a half times lower in tendons/ligaments than in skeletal muscle.
  - A low metabolic rate and anaerobic energy generating capacity are needed to carry loads and maintain tension for long periods as is typical of tendons.
- Low metabolic rate results in slow healing after tendon injury.
- Eccentric work requiring less oxygen consumption than concentric work eccentric training may be ideally suited for the rehab of tendons and ligaments.

Neuromuscular Rehabilitation

**Phase Three**
- Balance In the Athlete Three Systems
- Assessment and Training
  - Vestibular
  - Vision
    - Dynamic Visual Acuity
  - Somatosensory

Final Gaze – Quiet Eye- DVA
Are we helping are athletes see better?

- Seeing the Target
  - What is wrong with Andy’s eyes
    - The Ball
Quiet Eye – Dr. Vickers
Roger Federer Eye System

- How To Look At The Ball Like Roger Federer?
- Looking at the back of the racket for contact means you look at the ball longer
- This process clearly keeps the head and eyes still longer before contact and makes it easier for you to prevent the head from jerking forward during the swing.

Returning to Sports – Movement Patterns
Energy Systems

Phase Four

- Training Complex Movement Patterns
  - Advanced Trunk Stabilization Exercises
  - Explosive weight training – Ballistic Activities-Plyometrics
  - Balance – complex surfaces athletic movement patterns
  - Energy Systems – anaerobic – CP – Lactic Acid - Mitochondria

- Patterns in Athlete
  - Golf swing (physical limitations)
  - Baseball Pitching Phases (changes in Mechanics)
  - Running Mechanics – Foot Orthotics

Spinal Stabilization = Power/Pelvis & Hips

- McGill
  - Power generated in the spine is specific to angular motion of the vertebrae, results in greater force to the spine creating an increase risk of injury and decreased performance.

- Marras
  - Determined that spine velocity is associated with greater risks of back problems. In most athletic activities the power is generated by the hips with a stable trunk.
Axial Twisting - Protection

- Axial twist moments
  - results in a complex pattern of muscle activity involving substantial co-contraction of rectus abdomens and erector spinae muscles, despite their limited potential to generate twisting moments.
- Stiffening of the spine
  - via co-contraction of spinal muscles protects the spinal segments while rotational power is developed in the pelvis, hips, lower legs.

Stabilization Exercises – Endurance or Strength

Are we pushing our athletes to maximum with our exercise programs?

- Basic to Advanced

Advanced Exercises for Spinal Stability

- Perturbation training
  - unexpected movements of the upper and lower extremity activates the transversus abdominus to stabilize the spine by responding to afferent stimuli.
- Overhead throws using a medicine ball
- Balance activities
  - dynamic edge, tilt boards, shuttle balance system.
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How Important is Trunk and Pelvic Control
Foot Landing Position and Arm Posture

Chaudhari demonstrated that professional baseball pitchers that had greater Lumbopelvic control had greater velocity, better control and more endurance.

Arm Angle and Foot Postures
**Physical Limitations in the Golf Swing**

*Take Away*

1. Posterior capsule flexibility Left Shoulder = Horizontal adduction
2. Ninety degrees of external rotation in abducted position R. GH joint
3. Flexibility of the 3. Right anterior capsule = 90 Abd. Ext Rotn
4. Eccentric strength of the left hip external rotators, posterior fibers gluteus medius, & Glut Max controls left hip internal rotation and establishes a strong base
5. Strength of the Trunk muscle to reduce rotational forces during the back swing

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**Transition/ Downswing / Acceleration**

- **Transition**
  - Changing Direction = Balance is Critical
  - Quadriceps strength to hold knee flexion angle
    - Initiate downward swing
  - Requires transfer of weight through knees and feet (hip support)
  - Wrist strength to control flexion and allow supination (rotation)
  - Strength of the Trunk muscle to reduce rotational forces
  - Acceleration
  - Power in the pelvis (Abdominal Oblique) and hip external rotators

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**Returning the Injured Athlete to Sports**

Enhance the athlete's performance by:
- Increases the muscle force output, explosive power, of the hip, thigh and pelvis muscles
- Improves the endurance of the stabilizing muscles of the trunk core
- Increases the ROM and strength of the shoulder muscles to increase velocity
- Improves Balance – Proprioceptor and Vestibular systems
- Good Foot Mechanics – balance and muscle activation