

REHAB SUMMIT

208: Expand Your Sports Rehab Toolbox

Shaun Goulbourne, DHSc, PT, MTC, OCS,
SCS, STC, CSCS

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208: Expand Your Sports Rehab Toolbox

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Financial: Shaun Goulbourne has an employment relationship with Intrepid USA. He receives a speaking honorarium from PESI, Inc.

Non-financial: Shaun Goulbourne is a member of the National Strength and Conditioning Association.

Scope of Practice

“Materials that are included in this course may include interventions and modalities that are beyond the authorized practice of your profession. As a licensed professional, you are responsible for reviewing the scope of practice, including activities that are defined in law as beyond the boundaries of practice in accordance with and in compliance with your professions standards. “

Shaun Goulbourne

Athletics

Basketball – England
Basketball – High School
Soccer – Univ. of KY
Coach – Club, HS, ODP
Train – Marathons, Triathlons, Cross
fit

Academics

BHS, MHS, DHSc
CSCS & PT
MTC, STC, OCS, CSCS
Diploma in Osteopractic
Crossfit Instructor L2

Sports Rehab - It Takes a Village

- No single Modality can do the job
- Traditional PT, Yoga, Pilates, Running, Strength training, HIT, Endurance, Olympic Weight Lifting, Speed Training, Corrective Movement Training, IASTM, HVLAT, Dry Needling, Core Stability, Rest
- They all help at all times but more at different times

Specific Adaptations to Imposed Demands

Need More than the Sport

Surprisingly, athletes who spent 8 months or more playing a unilateral sport showed no significant gain in Single Leg Squat performance.

Athletes who spent 8 months or more in sport-specific training exhibited significantly more trunk control, revealed by less trunk lateral flexion, and less trunk flexion throughout an SLS.

Barfield JW, et al. Sport Specialization and Single-Legged-Squat Performance Among Youth Baseball and Softball Athletes. J Athl Train. 2019.

During our sport we tend to find a way to improve but often at the cost of bad mechanics
But the Single Leg Squat is a skill

Need More than the Sport

Landing Error Scoring System scores were lower in athletes who had a history of multisport high school varsity participation in basketball, lacrosse, soccer, or volleyball compared with those who had a history of single-sport or no participation in these sports at this level.
Multisport high school varsity participation in these sports may result in improved neuromuscular performance and potentially reduced injury risks as adults.

Herman DC, et al. Previous High School Participation in Varsity Sport and Jump-Landing Biomechanics in Adult Recreational Athletes. J Athl Train. 2019.

Need More than the Sport

- Novice runners are less economical and more prone to injury compared to well trained runners
- After some training, the novice runner's Hip ER moment increased significantly
- Improving running endurance does not necessarily lead to changes in running kinematics or kinetics
- It takes specific training to improve running economy and lower injury risk
- Mass et al 2019

Tasks

1. Core and Neuromuscular Re/education
2. Strength
3. Power (Olympic Lifts, Jumps, Hops)
4. Sports Mechanics
5. 5 R's (Rest, Recovery, Repair, Rebuild, Rejuvenate)
6. Postural Correction
7. Range of Motion, Mobility, and Flexibility
8. Individualized Program (Fixing weak links)

Goals

- Avoiding undue stress
 - Improved technique
 - Improved efficiency
 - Improved tissue tolerance
 - Improved wellness and self awareness
 - Managing Frequency, Intensity, and Time
 - Respecting the 5 R's (Rest, Recovery, Repair, Rebuild, Rejuvenate)

Goals

- Balancing
- Rigidity balanced with Absorption
 - Symmetry balanced with Specificity
 - Performance balanced with Prevention

Goals

- Be fit enough
- Sleep 8 hours per night
- Maintain Hydration (weight, urine color, BP)
- Have Balance nutritional Habits (Micro and Macro)
- Work hard and have Fun
- Complement Training
- Develop the Whip and Sling Shot

Goals

- Avoid too much too quick
- Follow 72 hour Recovery Rule
- 2 Hard days per week
- Increase Stress 10% per week (runners)
- Heiderscheit 2014

CORE AND NMT

Core Muscle Training

A consecutive 8-week core-muscle-training program improved lower limb and trunk biomechanics. These altered biomechanical patterns could be favorable to preventing sport-related injuries.

Sasaki S et al. Core –muscle Training and Neuromuscular Control of the Lower Limb and Trunk . J Athl Train 2019

Core Stabilization

The lack of reduction in trunk, hip, and knee measures of ACL injury risk during abdominal hollowing and bracing suggests that these techniques alone may provide minimal benefit in ACL injury prevention training.

Linde LD, et al. The effect of Abdominal Muscle Activation Techniques on Trunk on Lower Limb Mechanics during the Single Leg Squat Task in Females. J Sports Rehabil 2018.

Core Stabilization

Conclusions: A more erect landing posture following training suggests that the core training program may be beneficial for improving core stability. The long-term effect of core training for knee injury prevention needs further investigation.

Tsai YJ et al. Landing Kinematics, sports performance, and isokinetic strength in Adolescent male volley ball athletes; Influence of core training. J Sports Rehabil 2019

Hip Neuromuscular Training

Conclusion: For athletes with ACLR, hip biomechanical measures of ACL injury risk show significant improvements after completion of an NMT program.

Nageli C et al. Biomechanical Deficits at the Hip in Athletes with ACL Reconstruction Are Ameliorated with Neuromuscular Training. Am J Sports Med 2018.

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Conclusions: An NMT program can significantly improve muscle strength, hop tests scores, and the inter limb asymmetry in female basketball players.

Sabet S, et al. Trunk and hip control neuromuscular training to target inter limb asymmetry deficits associated with anterior cruciate ligament injury. Phys Ther Sport. 2019.

STRENGTH

Strength Versus Kinematics

The lack of correlation between isometric strength and kinematics in healthy female athletes indicates that intervention programs should not be focused solely on strength exercises to influence the movement pattern during single-landing activities.

Martinez AF, et al. Association of Hip and Trunk Strength With Three-Dimensional Trunk, Hip, and Knee Kinematics During a Single-Leg Drop Vertical Jump. *J Strength Cond Res.* 2018.

Strength Vs. Flexibility

Conclusion: Hamstring optimal lengths can be modified through flexibility intervention as well as strength intervention for male participants, but not for female participants in this study.

Li S, et al. Effects of flexibility and strength interventions on optimal lengths of hamstring muscle-tendon units. *J Sci Med Sport.* 2019.

Females may already have flexible hamstrings versus males
Females may have less risk of hamstring injuries
Females may train less overall than males

Ristolainen L et al. Gender differences in sport injury risk and types of injuries: A Retrospective 12 month study on cross country skiers, swimmers, long distance runners, and soccer players. *J Sports Sci Med.* 2009. 8(3): 443-451.

POWER

Jump Training

- There is an increased risk of knee swelling with jump training particularly with patients 18 months post ACL reconstruction.
- To reduce swelling there could be un-weighted jumping with higher repetitions and there may not be any significant difference in outcomes.

Elias ARC, et al. Clinical Efficacy of Jump Training Augmented With Body Weight Support After ACL Reconstruction: A Randomized Controlled Trial. Am J Sports Med. 2018.

Hop Stabilization Training

The 6-week hop-stabilization training program altered jump-landing biomechanics in male collegiate basketball players with CAI. There were large sagittal plane angles at the ankle, knee, and hip. There was reduced transverse plane angles at the knee hip and ankle. There was decreased ground reaction forces and a longer time to peak ground reaction force.

Ardakani MK, et al. Hop Stabilization Training and Landing Biomechanics in Athletes With Chronic Ankle Instability: A Randomized Controlled Trial. J Athl Train. 2019.

POSTURE

Posture

In the normal spine due to its curvature in various regions, C7 plumb line (C7PL) passes through the sacrum so that the head is centered over the pelvis-ball and socket hip joints and ankle joints.

This configuration leads to the least muscular activities to maintain the spinal balance.

For any reason like deformity, scoliosis, kyphosis, trauma, and/or surgery this optimal configuration gets disturbed requiring higher muscular activity to maintain the posture and balance.

Several parameters like the thoracic kyphosis (TK), lumbar lordosis (LL), pelvic incidence (PI), sacral slope (SS), Hip- and leg position influence the sagittal balance and thus the optimal configuration of spinal alignment.

Global sagittal imbalance is energy consuming and often painful compensatory mechanisms are developed, that in turn negatively influence the quality of life.

Shah AA, et al. Spinal Balance/Alignment - Clinical Relevance and Biomechanics. J Biomech Eng. 2019.

Posture

- Posture Effects Movement
- MTrP's Interferes with Posture and movement

Posture and Limb Injuries

- Collapsed Lordotic posture leads to:
- Anterior Pelvic Tilt, Hip IR, femoral anteversion, Knee Valgus, Tibial ER, Rearfoot Valgus, Pes Planus
- Plantar fasciitis, PFPS, Meniscus tears, ACL tears, IT band Syndrome, FAI, lumbar pain, spondylosis, trochanteric bursitis, chondral fractures, Acetabula Tears
- We should Fix lordosis and HIP IR

Femoral Acetabular Impingement

- Anterior Pelvic Tilt induces Hip IR
- Masek, Jason (2015). Femoral Acetabular impingement: mechanisms, diagnosis, and treatment options using Postural Restoration: Part 2. SportEX Medicine Journal, 65, 18-24

Fixing the Anterior Pelvic Tilt

- Mobility to the Hip Flexors and Lumbar
- Strength to Hip Extensors and Abdominal Muscles
- Mobility to the Chest and anterior Shoulders
- Strength to Thoracic extensors and posterior Shoulders

Posture Lab

- Standing Structure
- Foot and Ankle
 - Hallux Valgus Varus
 - Pes Planus Cavus
 - Rear foot Varus Valgus (normal 5 degrees valgus)
 - Knee
 - Genu Valgus Varus
 - Q angle (10-20 degrees)
 - Flexion extension (genu recurvatum)
 - Hips
 - ER IR (knee cap, femoral condyles, foot position)
 - Gluts
 - Muscle Development Shape (Box or Triangle)

Posture Lab

- Pelvis
 - 10-15 Anterior Pelvic Tilt (PSIS line to PSIS/ASIS line)
 - Rotation
 - Lateral Tilt
- Lumbar
 - Lordosis 30 degrees
- Thoracic
 - Kyphosis 30 degrees
 - Convexity /Concavity

Posture assessment

- <https://youtu.be/Zp5iC3loq7U>

INDIVIDUALIZED

Injury Prevention Programs

Conclusion: Future IPP's may be enhanced by targeting participants baseline profile deficits, highlighting the need to deliver an individualized and task specific Injury Prevention Program

Lopes TJA, et al. The Effects of Injury Prevention Programs on the Biomechanics of Landing Tasks: A Systematic Review With Meta-analysis. Am J Sports Med. 2018.

Hard /Destruction Day

- To be performed greater than 3 days a part but less than 7 days apart
- Working at 100+% of your maximum ability
- Outside of your comfort zone
- Probably not excited about
- Significantly better than your last performance
- Can not be done everyday
- Typical a less performance after this day
- Perceived exertion 9-10 on a 0-10 scale or 18-20 on a 6-20 scale or maximum heart rate 180-200.

Rate of Perceived Exertion

- 0-10 scale versus 6-20 scale
- Range from like nothing at all(0) to Very, Very heavy or hard (10)
- 0-2 or 6-13 can be performed daily
- 8-10 or 16-20 requires 72 hours recovery time to Rest, Heal, and Rebuild
- 6-20 related heart rate BPM times 10
- 60BPM is resting & 200BPM is working hard

Recovery Question Rating

1. I slept well last night
2. I am looking forward to the workout
3. I am optimistic about my next performance
4. I feel vigorous and energetic
5. My appetite is great
6. There is a very little muscle soreness

*1= strongly disagree, 5 = strongly agree

*0-10 requires increased rest interval

Alternate Days

- There was minimal difference in gains in balance, power, strength, agility, or sprinting with a blocked designed program versus a concurrent program of balance and plyometric exercises.

Muehlbauer T, et al. Effects of a blocked versus an alternated sequence of balance and plyometric training on physical performance in youth soccer players. BMC Sports Sci Med Rehabil. 2019.

Alternate Days

Perturbation-enhanced plyometric training, the F-MARC 11 + soccer specific warm-up, Oslo Neuromuscular warm-up, and resistance training are ineffective training modalities to reduce COD knee joint loads. Conflicting findings have been observed for the Core-Pac and mixed training programme.

Consequently, practitioners should consider incorporating balance and COD technique modification drills into their athletes' training programmes to reduce potentially hazardous knee joint loads when changing direction.

MOVEMENT

Fixing Mobility

- Multi-segment flexion and extension
- Multi-segment Trunk Rotation
- Multi-segment Side Bending
- Multi-segment Overhead Squat
- Multi-segment Lunges
- Multi-segment Marching

Functional Movement Screen

- <https://youtu.be/90LcizQWSbo>

Functional Movement

- Overhead Squat Test
 - Thigh to Parallel
 - Feet Neutral
 - Neutral Knee
 - Neutral Pelvis
 - Neutral Spine
 - Spinal Inclination (30 degrees)
- Multi-segment Rotation
 - Varying Strategies
 - Observe Foot, Ankles, knees, Hips, Pelvis, Thoracic
 - Flow of Rotation

Functional Movement

- Multi-segment Flexion and Extension
 - Varying Strategies
 - Observe Foot, Ankles, knees, Hips, Pelvis, Thoracic
 - Quality of Curves
- Overhead Walking Lunges
 - Thigh to Parallel
 - Feet Neutral
 - Neutral Knee
 - Neutral Pelvis
 - Neutral Spine

TREATMENT

Treatment Plan

- Improve Nutritional Intake (alkalines, vitamins and minerals, macronutrients)- Female Triad
- Maximize blood flow and healing to target area
- Improve resting position (posture)
- Improve mobility in and out of posture
- Improve posture under static stress (plank)
- Improve mobility against resistance
- Improve Speed of mobility

Treatment Plan

- Improve Endurance of mobility
- Improve Sports Specific activities with good mechanics
- Return to Training with good mechanics
- Return to Practice with good mechanics
- Return to Games with good mechanics

5 R'S

Initial Treatment

- Promote Soft Tissue Healing and muscle dysfunctions with HVLAT, IASTM, DN, Manual Therapies, Increasing blood flow as needed

IASTM

- Indications
 - Tendinopathies
 - Fascial Syndromes
 - Myofascial Pain Syndromes
 - Edema Reduction
 - Post ligamentous injuries
 - Entrapment Syndromes
 - Precompetition warm up
 - Post exercise recovery

IASTM

- Frequency and Duration
 - 2x/week with 72 hours in between
 - 8-10 minutes per region
 - 30-60 seconds per region

IASTM

IASTM refers to a technique that uses an instrument to remove scar tissue that had formed in soft tissues and assists in the healing process by activating fibroblasts.
IASTM is simple and practical and requires only a short period of time for a single treatment.
According to previous studies, IASTM was found to improve soft tissue function and ROM in acute or chronic sports injuries to soft tissues, while also reducing pain.
Such positive effects can be helpful in the fields of sports rehabilitation and athletic training.

[Kim J, Sung DJ, Lee J. Therapeutic effectiveness of instrument-assisted soft tissue mobilization for soft tissue injury: mechanisms and practical application. J Exerc Rehabil. 2017 Feb 28;13\(1\):12-22.](#)

IASTM

IASTM increased range of motion by allowing more dorsiflexion during the deepest part of the squat

Thus, IASTM may be used as a performance enhancing tool that has the potential to temporarily increase range of motion and flexibility in college athletes.

[Gamboa AJ, Craft DR, Matos JA, Flink TS, Mokris RL. Functional Movement Analysis Before and After Instrument-Assisted Soft Tissue Mobilization. Int J Exerc Sci. 2019 Jan 1;12\(3\):46-56.](#)

IASTM Gluteus Medius

- <https://youtu.be/At5BxDtvrM4>

IASTM Thigh

- <https://youtu.be/ogooagcRExk>

IASTM Lumbar

- https://youtu.be/NpGKF_7My5w

IASTM Ankle

- <https://youtu.be/yocaNjgUWo0>
- <https://youtu.be/pJmSP9psbto>

IASTM

- Relative Contraindications
 - Burn Scars (Prior to 9 months)
 - Kidney Dysfunction
 - Pregnancy
 - Anticoagulants
 - Fluoroquinolone antibiotics (known to cause severe tendon damage and or rupture, and permanent nerve damage in hands or feet) Cipro, Levaquin, Factive
 - Corticosteroids (increases fluid retention, diverts amino acids to glucose (anti-anabolic), can cause osteoporosis, dermatitis
 - Hormone replacements (can cause heart disease, blood clots, stroke, and breast cancer)

IASTM

- Relative Contraindications
 - Over varicose veins
 - Osteoporosis
 - Lymphedema
 - CRPS
 - Polyneuropathies
 - Unhealed closed fractures
 - Diabetes

IASTM

- Absolute Contraindications
 - Open wounds/unhealed sutures
 - Thrombophlebitis
 - Uncontrolled HTN
 - Inflammation due to Infection
 - Unstable Fractures
 - Contagious or infectious skin conditions

IASTM

- Absolute Contraindications
 - Flu or illness with flu like symptoms
 - Osteomyelitis (Bone infection)
 - Insect bite of unexplained origin
 - Hematoma or Myositis ossificans

Cupping

Moving cupping therapy may have short-term changes to range of movement but not power

[Murray D, Clarkson C. Effects of moving cupping therapy on hip and knee range of movement and knee flexion power: a preliminary investigation. J Man Manip Ther. 2019 Apr 19:1-8.](#)

Cupping

- https://youtu.be/ZQP4_SbbPds

Dry Needling

DN showed a significant effect on muscular endurance and hip flexion range of motion that persisted 4 weeks post treatment compared with placebo and non-intervention control group. It showed a significant effect on maximum force of knee extensors 4 weeks post treatment in elite soccer players.

[Haser C, et al. **Effect of Dry Needling on Thigh Muscle Strength and Hip Flexion in Elite Soccer Players.** Med Sci Sports Exerc. 2017 Feb;49\(2\):378-383.](#)

Dry Needling

This is the first study that demonstrates the beneficial effects of DN on hamstring flexibility, muscle compliance, and stretch tolerance without added stretching. The beneficial effects of DN should encourage clinicians to use DN as a novel strategy for increasing muscle flexibility.

[Ansari NN et al. **Immediate Effects of Dry Needling as a Novel Strategy for Hamstring Flexibility: A Single-Blinded Clinical Pilot Study.** J Sport Rehabil. 2019 May 23:1-6.](#)

Dry Needling Lumbar

- https://youtu.be/x1qQ_VT_W3Q

DN Gluteus Maximus

- Sciatic Nerve sits midway between the posterior aspect of the greater trochanter and the ischial tuberosity (avoid)
- Palpate superficial MTrP
- 30—50mm needles perpendicular to tissue
- Usually just medial to the lateral sacral margin at S4
- Just Lateral to the PSIS
- Just Medial to the Ischial Tuberosity
- Accupoints: BL27-30

DN Gluteus Medius

- 60-75mm needle
- Just Lateral and superior to the PSIS but superior
- Immediately inferior to the upper middle aspect of the iliac crest
- Immediately inferior to the upper lateral aspect of the iliac crest (posterior to ASIS)
- Periosteal Pecking
- Precaution: Superior Gluteal artery and nerve just lateral to PSIS
- Just Medial to the Ischial Tuberosity
- Accupoints: GB29

DN Gluteus Minimus

- ½ between the greater trochanter and the lateral aspect of the ASIS
- Periosteal Pecking
- Accupoints: GB29

DN Tensor Fascia Latae

- Lateral to medial halfway between ASIS and greater Trochanter
- More Superficial
- Accupoints: GB29

Blood Flow Restriction Exercises

- In recent years, research demonstrates that the use of blood flow restriction (BFR) combined with low-load resistance exercise (20–40% 1RM) can enhance the morphology and strength response in human muscle tissue.
- BFR is typically achieved via a pressurized cuff , tourniquet or elastic banding.
- The external pressure applied to the proximal portion of the upper or lower extremities should be low enough to maintain partial arterial inflow into the muscle, but high enough to occlude venous return from the muscle .

Blood Flow Restriction Exercises

- During periods of immobilization, the application of BFR alone has been shown to reduce muscular atrophy .
- However, to optimize muscular development, BFR must be combined with an exercise stimulus (aerobic conditioning or resistance training), with the greatest muscle strength and morphological responses achieved when BFR is combined with resistance training.

Blood Flow Restriction Exercises

Loenneke JP, Kearney ML, Thrower AD, Collins S, Pujol TJ. The acute response of practical occlusion in the knee extensors. *J Strength Cond Res.* 2010;24:2831–2834

Loenneke JP, Fahs CA, Rossow LM, Thiebaud RS, Mattocks KT, Abe T, Bemben MG. Blood flow restriction pressure recommendations: a tale of two cuffs. *Front Physiol.* 2013;4:249

Slysz J, Stultz J, Burr JF. The efficacy of blood flow restricted exercise: a systematic review & meta-analysis. *J Sci Med Sport.* 2016;19:669–675.

BFR

- <https://youtu.be/L6ygP7rWwb4>

MOBILITY

Functional Mobility Training

Tri-Planar Conditioning

Training Movements versus Muscles

- Sagittal
- Frontal
- Transverse

Train Movement

- The motor control system is not organized to isolate and control single muscles but rather is designed to control movements

Improving Local Range of Motion and Flexibility

- Joint Mobilization
- Muscle Stretching
- Myofascial Mobilization
- Strengthening
- Decreasing Muscle Tone

Muscle Length Tests

- Hamstrings - SLR
- Hip Flexors – Thomas
- Lumbar – sit and Reach (observe Thoracic Spine)
- Pec Minor – Shoulder height in Supine
- Pec Major – Y position stretch

Supine Lumbar and Hip Sequence

- Supine
 - Ankle Dorsiflexion stretch knee flexed and extended
 - Hip Flexion Stretch
 - Piriformis Stretch
 - Hamstring Stretch
 - Chicago Roll

Side Lying Lumbar and Hip Sequence

- Side Lying
 - Hip flexor Stretch
 - Quadriceps Stretch
 - ITB Stretch
 - Hamstring Stretch
 - Drop and Push Lumbar Joint Mobilization

Prone Lumbar Sequence

- Prone
 - Hip Flexor Stretch
 - Hip and Lumbar STM and IASTM

HVLAT

- Kawchuck 2015
- Cavitation
- A known process where opposing surfaces resist separation until a critical point when they then separate rapidly causing sustained gas cavities

HVLAT

- Indahl et al 1997
- HVLAT manipulation of the facet joints may elicit a stretch reflex from the capsule, contributing to an inhibitory action on muscle spasms, thereby relieving pain

HVLAT & MTrPs

- Fernandes de las Penas et al 2005
- There is a direct relation between joint dysfunctions and MTRP activity

Lying Thoracic Spine Manipulation

- Supine Patient Elbows Crossed
 - Patient supine elbows crossed, create tightness through elbows
 - Therapist Thenar eminence at targeted level discovered through PIVM, fingers flexed or flat, wrist flexed and radial deviated
 - Therapist chest centered over targeted area
 - Motion Thoracic extension and distraction thrust
- Prone Patient hands under forehead
 - Counter rotation PA's at Transverse Process at target levels

HVLA Thoracic

- <https://youtu.be/mDApxerLWA>

Lumbar HVLA

Push and body drop

- Patient Side lying
- Upper leg flexed (ankle locked in lower leg popliteal space)
- Contralateral Thoracic rotation
- Rotate pelvis towards anteriorly facing the ground
- Block Thoracic ipsilateral thoracic rotation on anterior upper shoulder/chest
- Therapist center COG over targeted area
 - Therapist Thigh on patient upper leg
 - Therapist ASIS over patient greater trochanter
- Thrust upper pelvis into ipsilateral rotation

HVLA LUMBAR

- <https://youtu.be/tL-6kTTwAp4>

Chicago Roll HVLA

Patient Supine

- Patient Locks fingers behind their neck
- Side bend patient to contralateral side
- Block Pelvis
- Pull Upper Thoracic spine (shoulders to Ipsilateral side)
- Once locked, downward Thrust through ASIS

HVLA Chicago Lumbar

- https://youtu.be/rcTwOm_e8rl

HVLT Absolute Contraindications

- Musculoskeletal
- Tumor
 - Infection (TB)
 - Metabolic Disorders (Osteomalacia)
 - Congenital (Dysplasias) abnormal development
 - Iatrogenic (Long term cortico steroid use)
 - Inflammatory – (RA-severe)
 - Trauma = fracture
 - Upper cervical instability (Down's Syndrome)
 - Excessive or extreme pain
 - Lack of Clinical Diagnosis
 - Lack of Patient Consent

HVLT Absolute Contraindications

- Neurologic
- Cord compression
- Cervical Myelopathy
- Cauda Equina
- Neural Compression (Progressive Neuro Deficit)
- Vascular
- VAI
- CAD
- Aortic Aneurysm
- Severe Hemophilia (poor blood clotting factors)

HVLT Relative Contraindications

- Inflammatory Arthritis
- Osteoporosis - Osteopenia
- Spondylolisthesis -Spondylolysis
- HNP
- Vertigo
- Hypermobility
- Arterial Calcification
- Previous adverse reactions
- Pregnancy
- Advanced DJD

Yoga Techniques

- Corpse Pose
- Childs Pose
- Childs Pose with Side Bend
- Frog Pose
- Pigeon Pose
- Downward Dog
- Upward Facing Dog
- Yoga Bridge
- Wheel Pose
- Camel Pose (Kneeling Extension)
- Rabbit Pose (kneeling Head to knees, hands on feet)
- Bound Ankle Pose
- Seated Forward Fold
- Boat Pose
- Couch Pose (Shin against wall lunge position)
- Pistol Squat

Corpse Pose



Child's Pose



Frog Pose



Pigeon Pose



Downward Dog



Upward Facing Dog



Bridge Pose



Wheel Yoga Pose



Camel Pose



Rabbit Pose



Bound Ankle Pose



Seated Forward Bend Pose



Boat Pose



Couch Stretch



Pistol Squat



Pilates Techniques

1. Standing Posture
2. Rolling
3. Peeling
4. Baby Crunches
5. Rib Cage Breathing
6. Big Toe Exercises

Standing

- Engage your core muscles to stand tall as much as possible
- Stand in Pilates V stance at first, squeezing your inner thighs together and pulling you navel in and up, feet equally weighted.
- Use any opportunity to pull gentle traction on your spine

Rolling

- Roll your feet out daily while sitting down, one foot at a time—use the smallest, hardest ball you can tolerate.
- Start with a tennis ball if you're sensitive or stiff, move to a hard rubber ball from the dime store.
- Try different sizes.
- 2 minutes per foot.
- Roll lengthwise and then strum side to side.
- Fascia Stick for body

Peel of the Wall

- Stand against the wall, with your spine gently resting into it (your low back and head needn't touch).
- Let your upper back, ribs and hips rest heavily into it. Your feet should be 6 inches from the wall, with equal weight placed into them.
- **Inhale** to grow tall along the wall
- **Exhale** (whisper "Ha" in the back of your throat to activate your core muscles and have them press into the wall) to nod your chin and slowly peel your spinal bones off the wall, one at a time.
- Stop above your waistband of your pants.
- Reverse the process

Baby Crunches

- Lie on your back in the bridge position with your tailbone heavy and long (isometrically pull heels and tailbone toward each other).
- With hands across chest or sliding along the mat, tilt chin toward chest, hollow out the bottom four ribs (below bra) and push them behind you as you exhale “Haaaaaa” and do a small crunch.
- Don’t use the neck to lift the head – use the ribcage engagement.

Ribcage Breathing

- **Lateral Ribcage Breathing:**
 - cross your hands across the front of your body to place open palms on the sides of your ribcage (lying on back or seated in a firm chair).
- INHALE into the side of your ribcage to fill your palms with pressure. EXHALE to reverse.
- **Posterior Ribcage Breathing:**
 - Practice breathing into the back of your ribs, trying to make your back wider by expanding your breath into the surface behind you on the INHALE. EXHALE to reverse.

Big Toe Exercises

- Broccoli Band
- Isolated dual toe flexion
 - Alternate toe flexion
 - Alternate ankle plantar flexion
 - Tibial ER

PLYOMETRICS

Stretching

- Wutvrouw E et al. The role of stretching in tendon injuries. BR J Sports Med. 2007; 41(4): 224-226.
- Sports with high SSC movements have a higher incidence of tendon injuries
 - Tendons require a great energy absorbing and energy releasing capacity
 - The elasticity of tendon structure is a leading factor in the amount of stored energy.
 - Prevention and rehabilitation programmes for tendon injuries should focus on increasing this tendon elasticity in athletes.
 - A static stretching program has no influence on elasticity
 - Ballistic stretching program can increase the elasticity
 - Both ballistic and static stretching should be incorporated.

STRENGTHENING

Strength

Based on the extent of the literature, it appears that there may be no substitute for greater muscular strength when it comes to improving an individual's performance across a wide range of both general and sport specific skills while simultaneously reducing their risk of injury when performing these skills.

Suchomel TJ, Nimphius S, Stone MH. The importance of Muscular Strength in Athletic Strength in Athletic Performance. Sports Med. 2016 Oct 46(10): 1419-49.

CORE STABILITY

Improving General Stability

- The Ability to Resist Movement
- The ability Transfer and not lose force and energy from one area to another
- Creating a Metal Beam Versus a Rope

Supine Anterior Pelvic Tilt Fix

- Hook-lying
 - Pelvic tilt
 - Hollowing
 - Bracing
 - Reverse Curls
 - 90/90 trunk rotation
 - SL Trunk Rotation
 - Curl Ups
 - Oblique Curl Ups
 - Lateral Reaches
 - Get Up Sit Ups

Hip Strengthening

Hip Extension/Abduction/ER

- Side Lying
 - Clam
 - SLR
- Physical Therapy Bridge
 - Pelvic Tilt
 - Butterflies
 - Marching
 - Trunk Rotation
 - Single Leg

Prone Plank Lab

- Prone Low Plank
 - Hold
 - Scapula Protraction/Retraction
 - Pelvic Tilts
 - Rotation
 - Forward Shoulder Presses
 - Vertical Shoulder Presses
 - Leg Raises
 - Spider Man
 - Low to High Plank
 - Walk Out
 - Walk Up
 - Crow Pose
 - Head Stand
 - Hand Stand

Spider Man Plank

- <https://youtu.be/HVyHcalg61g>

Side and Supine Plank

- Side Plank (+ feet elevated)
 - Hold
 - Pelvic Tilts
 - Bridges
 - Leg Raises
 - Vertical Row to Shoulder Press
- Supine High Plank
 - Hold
 - Pelvic Tilts
 - Bridges
 - Marches
 - Vertical Reaches

Side Plank Exercises

- <https://youtu.be/LsZn-vcYBZl>

Kneeling Strengthening

- Pelvic Tilts
- Double Arm Lifts
- Russian Hamstrings
- Knee Flexion
- Hip Extensions
- Thoracic Extensions
- Bent Hip Double Arm Lifts
- Bent Hip Running
- Bent Hip Swimming

Standing Core Stability

- Standing
- Mountain Pose
 - Tree Pose
 - Squat Pose
 - Chair Pose
 - Warrior 1 – Lunge Arms Up extended back leg
 - Warrior 2 – Lunge with Open Hips arms lateral
 - Warrior 3 - T/Superman
 - Extended Hand to Big Toe (Frankenstein)
 - Pistol Squat

Mountain Pose



Tree Pose



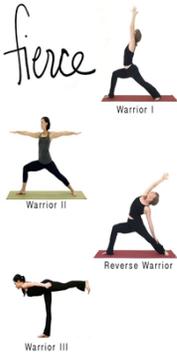
Squat pose



Chair Pose



Warrio fierce



Extended Hand to Big Toe



Pistol Squat



Dynamic Core Strength

- Single Arm Overhead Carry
- Single Arm Bent Over Rows
- Wind Mills
- Kettle Bell Swings
- Burpees
- Defensive Slides
- Monster Walks
- Sled Pushes

Dynamic Core Strength

- Single Arm Kettle Bell Work Out
 - Turkish Get Ups
 - Cleans
 - Arm Press
 - Push Press
 - Upper cuts
 - Swings to Chest
 - Swings to Overhead
 - Snatch

Turkish Get up

- <https://youtu.be/saYKvqSscuY>

Upper Body Strengthening

Standing Band Exercises

- Rows
- Extensions
- ER pull outs
- Horizontal Abductions
- Y's
- Throws
- Reverse Throws
- Trunk Rotation

Weight Lifting

- Upper Body
 - High Pulls
 - Strict Press
 - Pull Ups
 - Rope Climbs
 - Muscle Ups
 - Handstand Push Ups
- Legs
 - Squats
 - Frog Squats
 - Narrow Squats
 - Front Squats
 - Dead Lifts
 - Good Mornings
 - Step Ups
 - Lunges
- Single Leg Squats
- Bulgarian Lunges
- Hip Thrusts
- Pistol Squats
- Full Body
 - Hanging Knee Lifts
 - Hanging Leg Lifts
 - Overhead Squats
 - Push Press
 - Cleans
 - Jerk
 - Snatch

Basic Strengthening

- https://youtu.be/eBvy_A2iTmk

Improving Functional Endurance

- 10-15 repetitions per set
- 3+ sets per muscle group

POWER

Improving Power, Speed, and acceleration

- Jumps
 - (Multiple Directions) Up>Level>Down Soft>Rigid>React
- Hops
 - (Multiple Directions) Up>Level>Down Soft>Rigid>React
- Leaps
 - (Multiple Directions) Up>Level>Down Soft>Rigid>React
- Combinations (Power, Balance, COD)
 - Example: (With lateral displacement) Jump to Right Leg, Hop on Right Leg, Leap to Left Leg
- Jump Ropes
 - Single Under>Double>Single Leg
- Olympic Lifts (Snatch, Cleans, Jerks)
- Throws (3-way Slams, Reverse OH, Rotation)
- Passes (Chest, Shot Put, Roll, Windmill, etc.)
- 1-6 repetitions per set
- 3+ sets per muscle group
- Lighter or shorter for Speed and acceleration
- Sprints
- Towing

Sprint Training

Sprint interval training in the field significantly improved the 3,000-m run, time to exhaustion, Peak Power, and Mean Power in trained trail runners. Sprint interval training in the field is a time-efficient and cost-free means of improving both endurance and power performance in trained athletes.

Koral J, Oranchuk DJ, Herrera R, Millet GY. Six sessions of Sprint Interval Training Improves Running Performance in Trained Athletes. J Strength Cond Res. 2018 Mar; 32(3):617-623

Reacceleration

- Forward to Backward Jump to Sprint 3 yards
- Lateral Jumps to Sprint 3 yards
- Reversed Backward to Forward Jump Turn and Sprint 3 yards

Agility

- Game simulation changes of direction and speed

PERFORMANCE

Biomechanics

- Improve whole body mechanics
- Improve each link
- Improve force, power, endurance, rigidity, and endurance

Improving Performance

- Hong et al 2006
- Root is in the Biomechanics

Training - Individual

- Achieve 2000 repetitions of specific activity
- 6 weeks of Training (333 reps per week)
- 1 week of training 2 times per week (166 reps per day)
- 15 sets of 10-12 reps per day

Sports Specific Training

- Increase 10% per week

Prolonging Sports Performance

- Flexible Training Plan
- Manage Stress and Recovery (72 Hours)
- Improving Sport Skill
- Improving Movement Skill
- Posture Maintenance Sessions
- Vascular Recovery Sessions
- Mobility Sessions
- Cross Training – Improving all fitness elements

Continuing Education Credits

Access the Rehab Summit Evaluation on August 1st:

- An email will be sent to your registered email address
- An evaluation link will also be available on RehabSummit.com

Once you have completed the evaluation, you can choose to print, download, or email the certificate for your records.



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