Complete Sports Rehab: Hip

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EIM Evidence In Motion

Webinar Structure

Assessments and Interventions for Athletes

- Muscle Testing and Muscle Training
  - Position Mimicking
  - Closed Kinetic Chain Testing
    - Pelvis on femur
    - Femur on pelvis
- Quantitative Digital Tools
  - Dynamometry
    - Make test
    - Break test
  - sEMG
    - Tactile, Auditory, and Visual Feedback

For each technique that requires additional equipment (dynamometry, sEMG, etc…makeshift methods that can be done free or cheaply are recommended)

Manual Muscle Testing

Position Mimicking

- Manual muscle testing performed with the limb positioned to replicate the muscle's function and length-tension relationship during the task.

Closed Kinetic Chain Testing

- Pelvis on femur
- Femur on pelvis

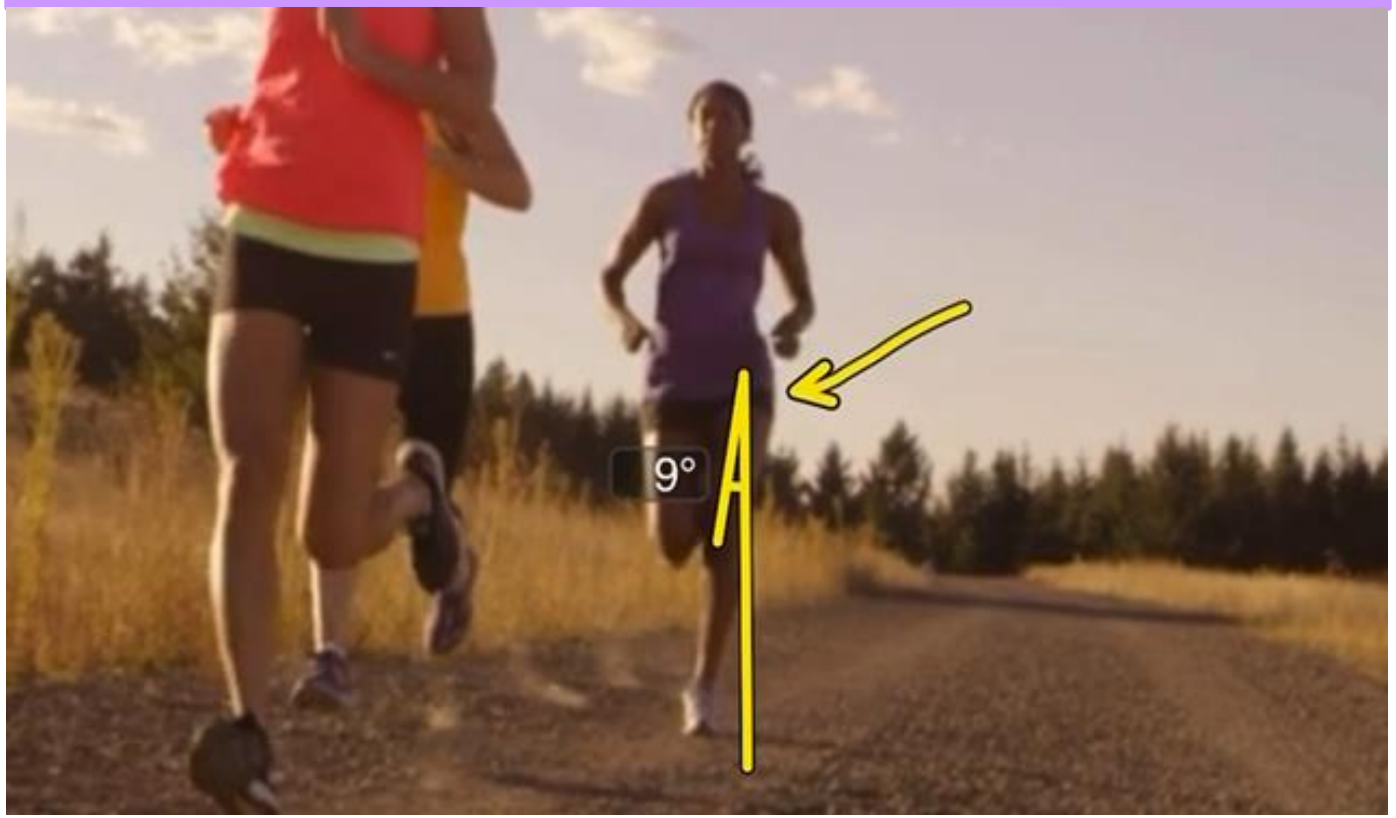
Position Mimicking

Case

The runner in the purple has left sided medial knee pain

Case

Movement Assessment



Muscle Performance

Classic End Range Muscle Testing

- Gluteus maximus tests 4+/5
- Gluteus medius tests 4+/5

Position Mimicking Assessment

Hip Extensor Isometric Strength in Hip Flexion

The failed test becomes the treatment

Position Mimicking Assessment

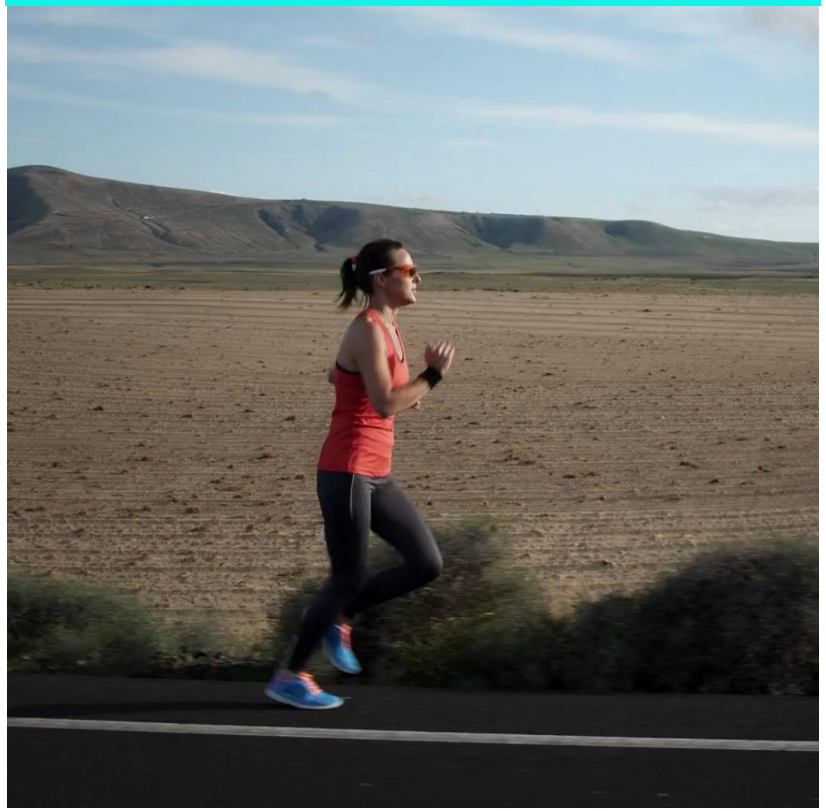
Glut Med Muscle Strength in Adduction

The failed test becomes the treatment

Closed Kinetic Chain Testing

Case

Lateral View

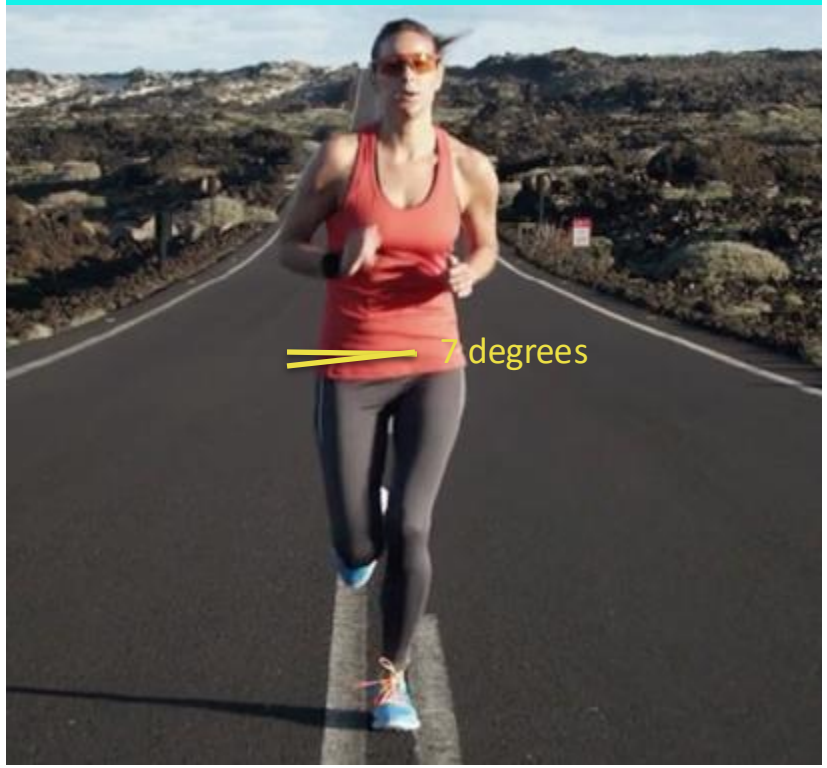


Anterior View

Right lateral hip pain when running greater than 5 miles

Case

Left Impact/Absorption



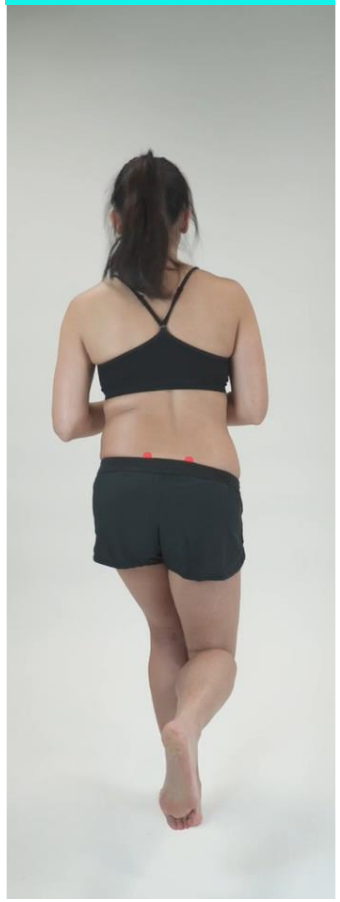
Right Impact/Absorption

Right lateral hip pain when running greater than 5 miles

Progressive Load Assessment

SLB

SLB + Hop



SLB + Hop + Weight

SLB + Step + Weight

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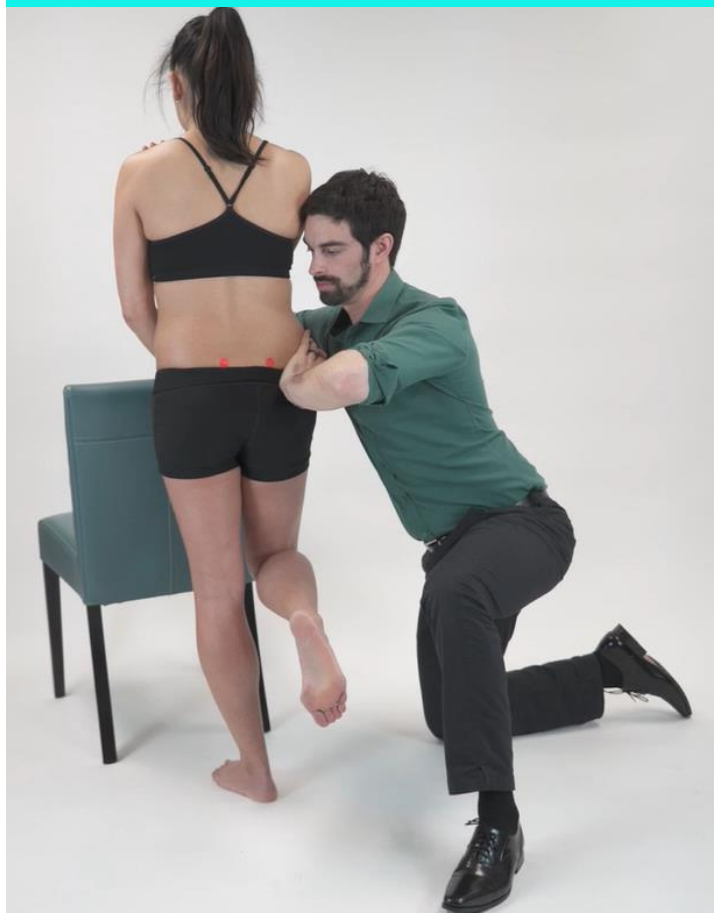
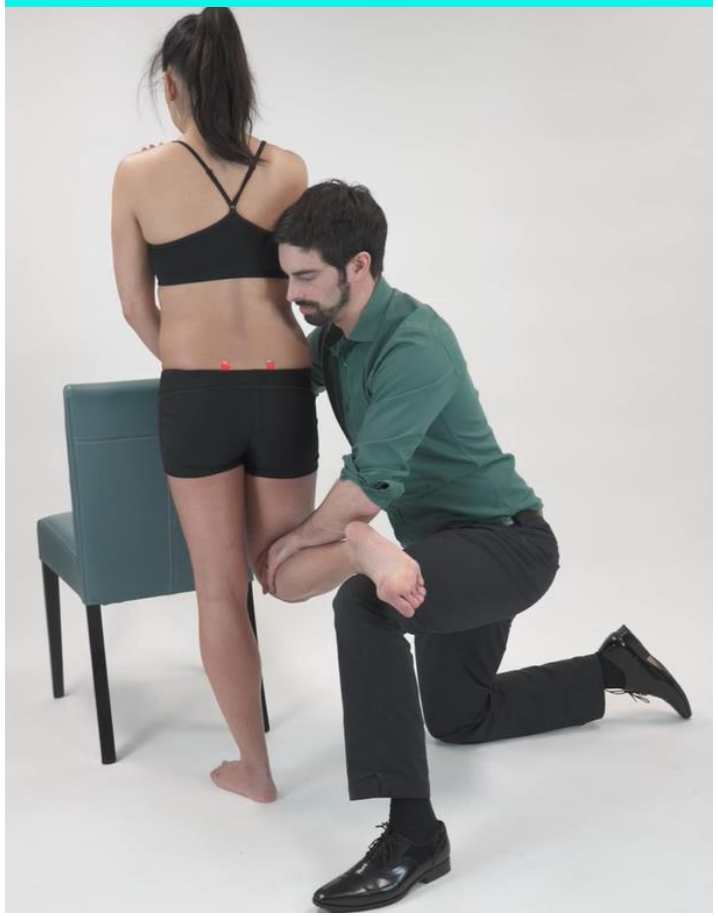
CKC Pelvis on Femur MMT Assessment

CKC Glut Muscle Test 1



CKC Glut Muscle Test 2



CKC Pelvis on Femur Treatment

Closed Kinetic Chain Hip Hikes To Metronome

- Set the cadence to half the athlete's running stride rate
- If their cadence is 160–180 steps per minute, use 80–90 BPM to match their stride timing

Case

- Left anterior hip pain standing
- Can no longer play volleyball
- Worse with serving

Progressive Load Assessment

Single Limb Squat

Single Limb Hop

Single Limb Step Off

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CKC Femur on Pelvis MMT Assessment

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CKC Femur on Pelvis Treatment

Valgus Control

Quantitative Digital Tools

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Quantitative Digital Tools

Dynamometer

- Compression/Tension
- Make/Break

Surface EMG

- Muscle compensation testing

Dynamometer

Dynamometry Options

Tension Dynamometers		Compression Dynamometers	
Tindeq	Kinvent-Pull	ActivForce	Kinvent-Push
			

Testing Variation:

- Tension versus Compression
- Makeshift Methods
- Isometric vs. Concentric vs. Eccentric
- Make Test versus Break Test
- Rate of Force Development

Makeshift Methods

Bathroom Scale	Luggage Scale	Handheld Dynamometer	Crane Scale
			

Dynamometry Research

- A sample of 106 men and 125 women volunteers were tested twice with an Ametek digital hand-held dynamometer
- The measurements were found to be reliable
- Predictive equations were provided for the measurements
- Reference values generated are expressed in Newtons and as a percentage of body weight and are organized by gender, decade of age, and side

Hand-held dynamometry is a reliable assessment, and values obtained in a clinical setting can determine if an individual is impaired relative to healthy subjects of the same gender and age

Bohannon, Richard W. "Reference values for extremity muscle strength obtained by hand-held dynamometry from adults aged 20 to 79 years." Archives of physical medicine and rehabilitation 78.1 (1997): 26-32.

Make Versus Break Test

Make Test	Break Test
The athlete flexes the muscles, but is stabilized by an examiner	The examiner pushes the dynamometer against the athlete's limb until the joint gives way
The reliability (both intra-rater and inter-rater) of the make-test is higher than that of a break-test	The force produced by a break-test tends to be higher than that of a make-test

Interventions

Isometric (Concentric) - Isometric (Eccentric)

Overcoming Isometric (Concentric Iso):

- Sidelying hip abduction hold against a fixed strap
- Standing hip abduction hold into a wall

Yielding Isometric (Eccentric Iso):

- Sidelying hip abduction hold with a weight
- Standing hip abduction hold into a looped resistance band

Surface EMG

EMG

Intramuscular EMG:

- An invasive procedure involving fine needle electrodes inserted directly into the muscle. It provides detailed information about individual muscle units, aiding in diagnosing pathologies and identifying specific muscle activation patterns. Needle EMG can be uncomfortable, requires expertise, and may not capture the overall muscle activity of a larger area accurately.
  - Needle electrodes in muscle
  - Measures individual muscle units
  - Invasive, with needles
  - Suitable for specific muscles
  - Used for diagnostics and pathology

Surface EMG:

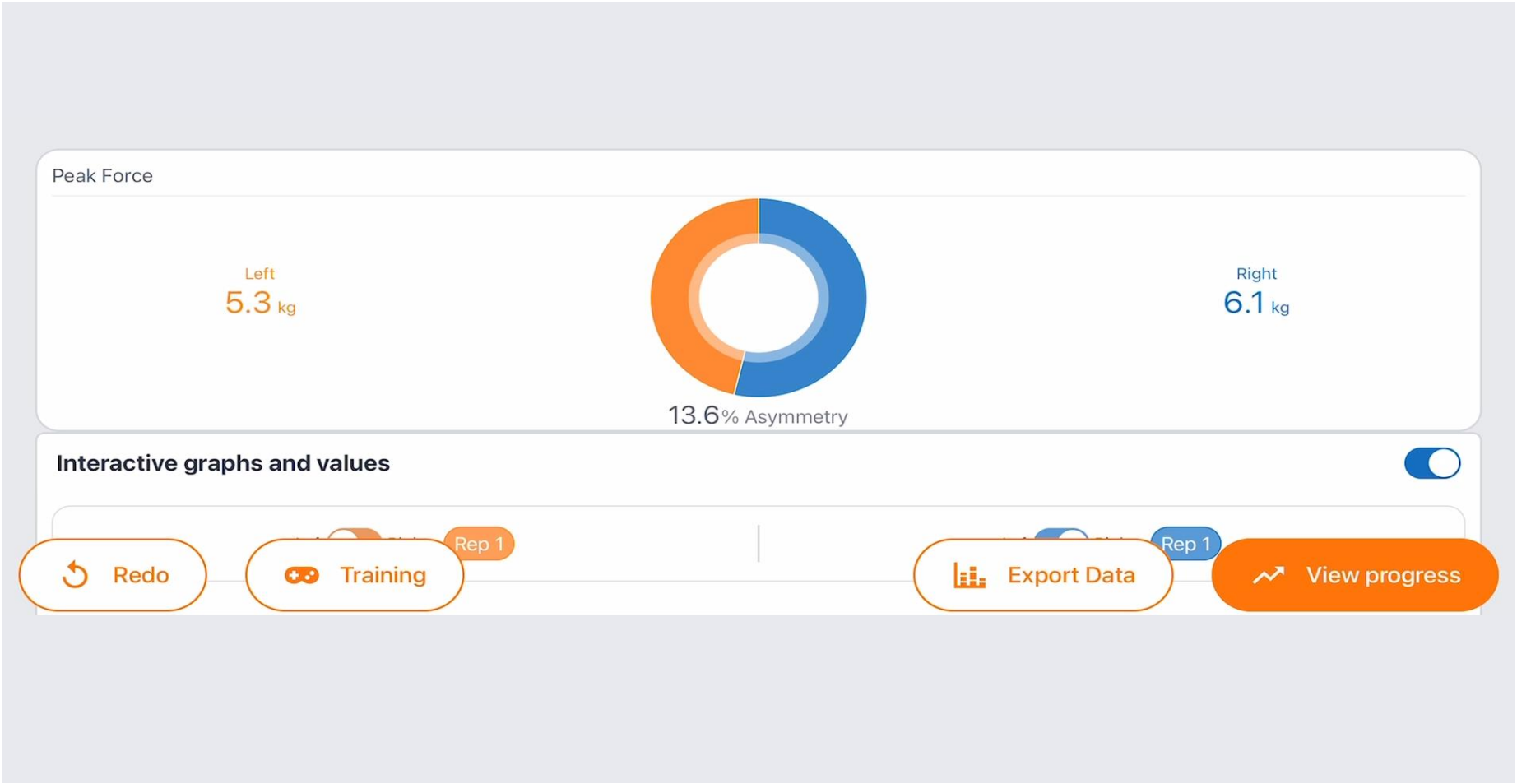
- A non-invasive method that measures overall muscle activity using electrodes on the skin. It is easy to apply and suitable for assessing large muscle groups in functional assessments. However, it may lack precision compared to needle EMG and can be subject to signal interference.
  - Electrodes on skin surface
  - Measures overall muscle activity
  - Non-invasive, no needles
  - Suitable for large muscle groups
  - Used for functional assessments

Case

Subjective

- A rugby player with left sided low back pain
- Palpation of quadratus lumborum reproduces the symptoms
- Goal is to determine if gluteus medius weakness is playing a role in the athlete's low back pain

Gluteus Medius Dynamometry



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Gluteus Medius Dynamometry

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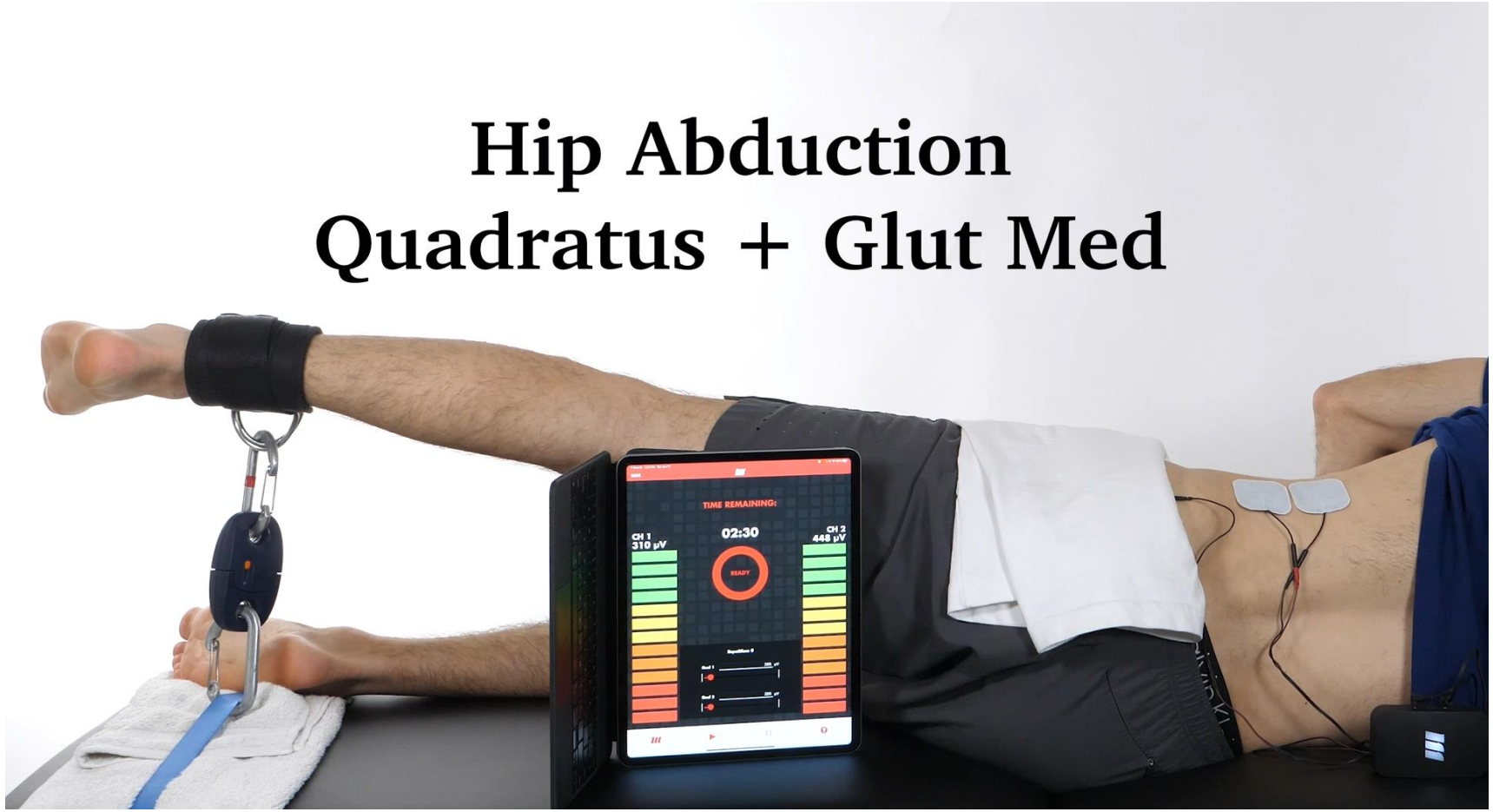
sEMG Muscle Compensation Testing



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Practical Applications

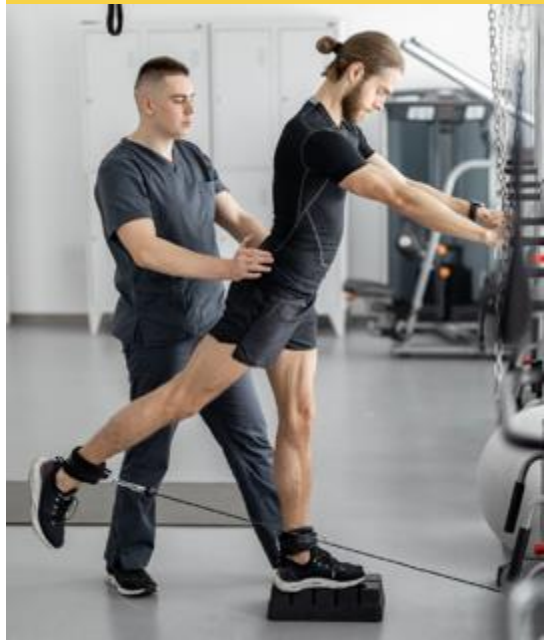
- Dynamometry tests the strength of an athlete in a testing position but does not indicate whether or not the proper muscles are being recruited
- You must pay attention to exact landmarks and direction of pull with tension dynamometry for accurate results
- Supplementing dynamometry with sEMG can provide information indicating the degree of compensation from adjacent muscle groups
- Care should be taken with pad placement and results should be compared to the contralateral side
- sEMG can further be used to determine whether or not the muscle is being used in function and be used as neuromuscular re-education

Makeshift Assessment Methods

Palpation	Observation
• Tension or tonicity • Texture and pliability • Tenderness or trigger points	• Visible hypertrophy or atrophy • Timing of muscle engagement • Substitutions or compensations

Facilitation

Tactile



Auditory

Visual

Tactile Feedback Treatment

Glut Med Cueing

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Tactile Feedback Treatment

Facilitatory Tapping Hip Flexed

Facilitatory Tapping Hip Extended

Weight Bearing Cue

Pelvic Cue

Rotational Cue

Note: Fingers on athlete's left hand can also be extended based on the philosophy of mirroring developmental positions

Tactile Feedback Treatment

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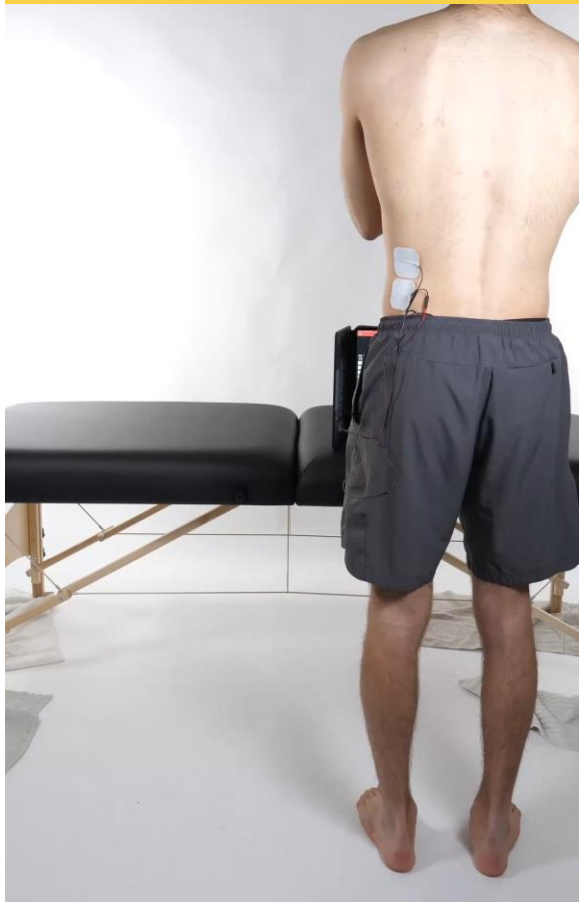
Auditory Feedback Treatment

Digital Auditory (sEMG)



Human Auditory

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Visual Feedback Treatment

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Summary

- Position-mimicking and closed kinetic chain (CKC) testing replicate functional tasks to assess how muscles perform during functional tasks
- Dynamometry gives objective strength data and detects side-to-side imbalances or deficits compared to normative values
- Surface EMG identifies which muscles are activating and when
- You don’t need high-end tools—just understand the concepts: use a luggage scale (dynamometry), palpation/observation (EMG), functional tasks (CKC), and tactile/visual cues (neuromuscular control)

Additional Learning

Complete Sports Rehab: Upper and Lower Half Bundle

NEXT UPCOMING:
Online, Self-Directed • Start any time. Online - Self-Paced.

Online Only
LENGTH: Self-paced

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FOR: PT/PTA, OT/OTA, ATC, OTHER LICENSED HEALTHCARE PROVIDERS

This course series teaches you how to use the movement system to assess, diagnose and treat athlete movement dysfunction. This series covers both the upper half and lower half of the body.

The material is highly interactive with an emphasis on the practical application of principles covered in the course. At the conclusion of the course, you will have a greater understanding of how to integrate movement-based assessments into sport-specific treatments.

https://evidenceinmotion.com/course/complete-sports-rehab-bundle/

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