Core Training for the Athlete

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OBJECTIVES

1. Provide a challenging, progressive core training program targeted at athletes or late stage rehab clients
2. Identify common breakdowns in exercise performance and discuss cues for proper correction

What is “The Core”

- “the lumbo-pelvic hip complex, consisting of the lumbar spine, pelvis, and hip joints, and the active and passive tissues that produce or restrict motion of these segments”

The Core as a Muscular Box (2)

- **Anterior** - rectus and transverse abdominis
- **Posterior** - spinal erectors and multifidi, gluteus maximus
- **Lateral** - quadratus lumborum and internal and external obliques, gluteus medius
- **Top** - diaphragm
- **Bottom** - pelvic floor

Target Population:

**Active Athletes and Late Stage Rehab Patients**

- If pain or instability is a concern, make sure the athlete has demonstrated baseline activation and control of transverse abdominis and multifidi, (2)
- Identify issues of muscle imbalance and inhibition of gluteus medius and maximus (3)

Key Concepts:

- **Proximal Stability for Distal Mobility:** one of the primary functions of the core is to resist movement and provide a stable base for the power generators of the upper and lower limbs, "proximal stability for distal mobility" (4)
Key Concepts:

**Importance of the Glutes**

- Leetun et al 2004 (5) – athletes who were weaker in hip ABD and ER were more likely to be injured over the course of the year
- Crow et al 2012 (6) - low load exercise protocol targeting gluteal group is effective at acutely enhancing peak power output in athletes

Key Concepts: Isolation vs. Integration

- Multiple muscles, both global and local work together to achieve stability during functional movement tasks.
- "the relative contributions of each muscle continually change throughout a task, such that discussion on the most important stabilizing muscle is restricted to a transient instant of time" Stuart McGill 2004 (7)

Phase I-Stabilization/Endurance

1. Anti-Extension
2. Anti-Flexion
3. Anti-Rotation
4. Anti-Sidebending

- Begin with isometric holds and progress to active movements
- In early stages or if pain is present, cue athlete on abdominal bracing maneuver - it has been shown to foster torso co-contraction, reduce lumbar displacement, and increase trunk stability

Vera-Garcia et al. 2006 (8)
1. ANTI-EXTENSION

Purpose:
These exercises work to resist extension of the spine, thereby targeting the muscles of the anterior core

Front Plank

• Maintain neutral cervical, thoracic and lumbar curves, breathe normally
• Work up to 45 sec to one minute static holds, then increase level of difficulty

Physioball Rollout

• The roll-out and the pike were the most effective in activating the rectus abdominis, obliques, and latissimus dorsi muscles, while minimizing lumbar paraspinals and rectus femoris activity

Escamilla JOSPT 2010(9)
Power Wheel Pike

- Can be done using a Power Wheel as pictured, or with feet on a physioball
- Cue athlete to keep spine straight, and exhale as he/she comes up

Body Saw

2. ANTI-FLEXION

Purpose:

Provide a training stimulus to the muscles of the posterior core as they work to prevent flexion of the spine
Bird Dog

- Maintain a neutral spine
- Slowly raise one leg and the opposite arm to a neutral position.
- Avoid excessive shoulder or hip extension
- Increase reps or hold at top positions 5-10 seconds

Hip Hinge With Dowel

- Encourages proper hip mobility while maintaining a neutral spine
- Lays the ground work for successful squatting, deadlifts, etc.
- Common form breakdowns are excessive lumbar lordosis, or failure to keep dowel in contact with sacrum

One Leg Romanian Deadlift

- Advancement of the hip hinge, with balance component
- Only allow range of motion that the athlete can control
- Slight bend in knee, and weight stays close to the stance leg
3. ANTI-ROTATION

Purpose:
Target the muscles that prevent rotation of the spine—multiple muscles involved.

Glute Bridge with Knee Extension

- Knee is extended providing a challenge to control the tendency to rotate to that side.
- Arms can be crossed on the chest to further increase the level of difficulty.

Paloff Press

- Start with an isometric hold in an athletic stance.
- 10 – 20 second holds then progress.
- Pressing out adds more challenge as the arms move away from the body.
Paloff Press – Stir the Pot

- Ensure that athlete maintains a stable body position
- Add rotations in a clockwise, then counter-clockwise direction

Landmine Rotation – stable trunk

- Goal for this phase is to minimize any trunk motion
- Weights can be added to the bar as needed

Landmine Rotation- deep squat

- Takes the legs out of the equation
- Good for those who need stability in deeper levels of knee or hip flexion- football linemen, weight lifters, wrestlers
4. ANTI-SIDEBENDING

Purpose:
Challenge the muscles that prevent bending of the spine to one side, thereby activating the lateral core

Side Plank
- Keep the trunk as straight as possible in the frontal as well as the sagittal plane
- Build up to 45 sec to 60 sec holds, then add progressions

Unilateral Farmer’s Walk/ Suitcase Walk
- Great challenge to the lateral core musculature with carryover to functional tasks
- Build load slowly
Reverse Lunge with Kettlebell

• Valslide under rear foot as athlete slides back into a posterior lunge position
• Kettlebell or dumbbell causes right sidebending moment that the athlete must resist to stay upright
• Watch out for hyperextension of lumbar spine. Hip flexor tightness may be a limiting factor and need to be resolved first

Lateral Paloff Press

• Can be performed with cable column or resistance band
• Isometric hold to resist sidebending moment, progressing into a press

Phase II-Strength/Power Production

• Incorporate functional movement patterns which allow active motion of the spine now that a stable base has been trained
• Often rotational or multi-planar in nature
Landmine Dynamic Rotation

Ball Slams

Chop Throw with Partner
Overhead Throws

Medicine Ball Rotational Throw
- The addition of a 12 week program of medicine ball training has been shown to increase baseball performance variables

Szymanski et al. Journal of Strength and Conditioning Research, 2007 (10, 11)

The Big Basics
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- High levels of activation in core muscles has been demonstrated with lifts such as the squat, deadlift, cleans, and overhead pressing variations (Hamlyn 2007(12), Nuzzo 2008(13), Willardson 2009(14))

- “Ground-based free-weight lifts are highly recommended for athletic conditioning of the core musculature because they can provide the moderately unstable environments to augment core and limb muscle activation while still providing maximal or near maximal force and power outputs” - Behm 2010(15)

Sum it Up

1. Start with controlled isometrics activities to develop endurance in multiple planes
2. Appropriately add time, reps or resistance to increase the demand - focus on endurance first
3. Build into retraining functional movement patterns - squats, lunges, deadlifts, rotations
4. Develop explosive movements and try to mimic the functional demands of the specific sport

Thank You!

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References:


