Practical Application for Athletic Trainers

OVERHEAD SQUAT ASSESSMENT AND REHABILITATION

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Which one?

- NASM - CES
- FMS
- SFMA
Assessment

- The NASM - OHS assessment is the quickest and easiest to perform at the start of the sport season.
- Information obtained can be used to tailor pre-habilitation programs specifically to the needs of each individual athlete.
- A word about prevention!
Primary Movements

- Two Primary Movement Assessment:
  - NASM-CES
    - Overhead Squat
    - Single-leg Squat

- Dynamic Assessment (other)
  - Single-leg Step Off
  - Functional Movement
Rational - OHS

- The OHS assesses:
  - total body structural alignment
  - dynamic flexibility
  - and neuromuscular control from a bilateral standing posture.
- Squatting requires optimal motion in the ankles, knees, and hips.
- Having the arms elevated overhead:
  - stresses the musculature surrounding the shoulder complex
  - increases the demand placed upon the core stabilizing muscles.
To perform the OHS correctly without compensation in structural alignment, one must demonstrate:

- optimal and bilaterally symmetrical dynamic range of motion at each joint (length-tension relationships)
- optimal force-couple relationship (proper recruitment strategies).
Practicality

- Once compensations are found we will be able to tell:
  - Probable overactive muscles
    - Inhibit/Lengthen
    - Flexibility Exercises will be used
      - Self-Myofascial Release (SMR)
      - Static Stretching
      - Neuromuscular Stretching
  - Probable underactive muscles
    - Activate/Integrate
    - Strengthening exercise will be used
      - Positional Isometrics
      - Isolated strengthening
      - Integrated Dynamic Movement
Kinetic Chain Checkpoints

- Foot/Ankle
- Knee
- Lumbo-Pelvic-Hip Compels (LPHC)
- Shoulder and Cervical Spine (Upper Body)
Overhead Squat Assessment

Anterior

Lateral

Posterior
Set-up

- Feet straight ahead
- Shoulder width apart
- Arms raised above their head as shown
Procedures

- Perform a series of squats 5 times per view
- Squat to the depth of an average chair height
Anterior View

- Kinematic check points
  - Feet
  - Knees
- Feet
  - Should be straight ahead, 2nd metatarsal of each foot should be parallel to one another
- Knees
  - Knees move inward
  - Knees move outward
# Anterior View

<table>
<thead>
<tr>
<th>View</th>
<th>Checkpoint</th>
<th>Compensation</th>
<th>Probable Over-active Muscle</th>
<th>Probable Under-active Muscle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knees</td>
<td></td>
<td>Move Outward</td>
<td>Piriformis Biceps Femoris TFL Gluteus Medius Gluteus Minimus</td>
<td>Adductor Complex Med. Hamstring Gluteus Maximus</td>
</tr>
</tbody>
</table>
Lateral View

- **Two main Checkpoints**
  - LPHC
    - Excessive forward Lean
    - Back Rounds
    - Back Arches
  - Upper body
    - Arms fall forward
Lateral View – Excessive Forward Lean
## Lateral View

<table>
<thead>
<tr>
<th>View Lateral</th>
<th>Checkpoint</th>
<th>Compensation</th>
<th>Probable Overactive Muscle</th>
<th>Probable Under-active Muscle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Body</td>
<td>Arms Fall Forward</td>
<td>Latissimus Dorsi, Pectoralis Major/Minor, Coracobrachialis</td>
<td>Mid/Lower Trapezium, Rhomboids, Posterior Deltoid, Rotator Cuff</td>
<td></td>
</tr>
<tr>
<td>LPHC</td>
<td>Excessive Forward Lean</td>
<td>Soleus, Gastrocnemius, Hip Flexor complex</td>
<td>Anterior Tibialis, Gluteus Maximus, Erector Spinae</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Back Arches</td>
<td>Hip Flexor Complex, Erector Spinae, Latissimus Dorsi</td>
<td>Gluteus Maximus, Intrinsic Core Stabilizers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Back Rounds</td>
<td>Hamstrings, Adducor magnus, Rectus Abdominis, External Obliques</td>
<td>Gluteus Maximus, Erector Spine, Intrinsic Core Stabilizers</td>
<td></td>
</tr>
</tbody>
</table>
Posterior View

- Check Points
  - Feet
    - Flatten
    - Heels Rise
  - LPHC
    - Asymmetrical Weight Shift
# Posterior View

<table>
<thead>
<tr>
<th>View</th>
<th>Checkpoint</th>
<th>Compensation</th>
<th>Probable Overactive Muscle</th>
<th>Probable Underactive Muscle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior</td>
<td>Feet</td>
<td>Flatten</td>
<td>Peroneal Complex</td>
<td>Posterior Tibialis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Toe extensor complex, Lat. Gastrocnemius, Biceps Femoris, TFL</td>
<td>Anterior Tibialis</td>
</tr>
<tr>
<td></td>
<td>Heel Rise</td>
<td>Soleus Gastrocnemius</td>
<td></td>
<td>Med. Gastrocnemius</td>
</tr>
<tr>
<td></td>
<td>LPHC</td>
<td>Asymmetrical Weight Shift</td>
<td>Adductor Complex (on same side of shift), TFL, Piriformis, Bicep Femoris, Gluteus Medius (on opposite side of shift)</td>
<td>Gluteus Medius (on side of shift), Adductor Complex (on opposite side of shift)</td>
</tr>
</tbody>
</table>
OHS Modifications

- Heals raised
- Hands on Hips
Rational - SLS

- Assesses lower body dynamic flexibility and neuromuscular control as well as balance form a unilateral standing position.
- Provides a greater challenge to the LPHC as the base of support for the body has been reduced.
- This forces the core and the proprioception mechanism to work harder.
- Also assesses functionally applicable movements used in everyday activities.
Single-Leg Squat Assessment

- **Starting Position**
  - Feet straight ahead
  - Shoulder width apart
  - Hands on hip
  - Shift weight to one leg

- **Procedures**
  - 3 squats with hands on hips
  - Comfortable depth
LPHC – Hip Hike/Hip Drop

- Pelvis should remain level in the frontal plane
- LPHC- Hip Hike or drop
- Knee goes valgus
Single-Leg Step Off

- Added to OHS and SLS as a dynamic evaluation of biomechanics and function.
- Most knee injuries occur in the valgus knee position.
Right leg step off
Left leg step off
Functional Movement Scale

- Designed to evaluate athletic movement of agility, power, speed and functional strength
  - No validity or reliability data as of date
Test

- Standing long jump
- Vertical jump
Standing LJ
Standing LJ
Most Common Findings

- Excessive forward lean (weak intrinsic core)
- Knee Valgus with single leg stance (weak gluteal region/poor balance)
- Foot Pronation (anterior/posterior tibialis imbalance)
- Heel Rises (overactive soleus)
- Correction with heal elevation (LPHC)
- Erect landing (poor technique)
Excessive Forward Lean (Lateral View)

- Overactive
  - Gastrocnemius
  - Soleus
  - Hip Flexor Complex
  - Abdominal Complex
    - Rectus abdominis and External Oblique

- Underactive
  - Anterior Tibialis
  - Gluteus Maximus
  - Erector Spinae
  - Intrinsic Core Stabilizers
<table>
<thead>
<tr>
<th>Phase</th>
<th>Modality</th>
<th>Muscles(s)</th>
<th>Acute Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibit</td>
<td>SMR</td>
<td>Gastrocnemius/soleus Hip flexor Complex (TFL/rectus femoris)</td>
<td>Hold on tender area of 30 seconds</td>
</tr>
<tr>
<td>Lengthen</td>
<td>Static Stretching or NMS</td>
<td>Gastrocnemius/soleus Hip flexor Complex</td>
<td>30-sec hold or 7-10 sec. isometric contract, 30 sec. hold</td>
</tr>
<tr>
<td>Activate</td>
<td>Positional Isometrics and/or Isolated Strengthening</td>
<td>Gluteus Maximus Core stabilizers</td>
<td>4 reps or increasing intensity 25, 50, 75, 100% OR 10-15 reps with 2 sec. isometric hold and 4 second eccentric</td>
</tr>
<tr>
<td>Integrate</td>
<td>Integrated Dynamic Movement</td>
<td>Ball Wall Squat</td>
<td>10-15 reps under control</td>
</tr>
</tbody>
</table>
Knee Valgus

- Found on Anterior View
Foot Pronation

- Found on Posterior View
Heel Rises

- Found on Posterior View
Conclusion

- Movement assessments are the cornerstone of an integrated assessment process.
- Used to observe the length-tension relationship, force-couple relationships, and joint motions of the entire kinetic chain.
- This process is only part of the assessment we perform on the athletic prior to competing.
References

- NASM – CES Movement Assessment
- NCAA – ISS data