Rehabilitation of Low Back Injuries in Football Players

By
Albi Gilmer, OCS, Cert MDT

Typical Lumbar Injuries in Football Players Seen in Rehab

- Disc Injuries
- Lumbar Instability
  - Spondylolysis and Spondylolisthesis
  - Clinical Instability
- Facet Injuries

Keys to Effective Treatment

- Where is the pain generator?
- Proper classification of injury
- Minimize pain / Restore function
- Proper discharge testing / planning
- Prevention

Classification of Injury

- The Examination
  - Integrative Movement Testing (ie. SFMA)
  - Repetitive Motion Testing Lumbar Testing in Standing and possibly in lying
  - Neuro Testing of LE’s
  - Special Testing
  - Manual Testing

Selective Functional Movement Assessment (SFMA) Top Tier – 7 movements

- Cervical Patterns
- UE patterns
- Multisegmental Flexion
- Multisegmental Extension
- Multisegmental Rotation
- Single Leg Stance
- Overhead Squat

SFMA

- After top tier testing determine if movement limitations are due to...
  - Pain
  - Lack of stability
  - Joint tightness
  - Soft tissue tightness
  - Some combination of these.
Repetitive Motion Testing

- Forward flexion in standing to **end range** – 6 – 10 repetitions
  - What happens to their motion and symptoms?
- Wait 1-2 minutes if symptoms change
  - Do changes remain?
- If unsure repeat the process in flexion
- Repeat this process with backward bending in standing.
- It may be necessary to do this in lying as well

Repetitive Motion Testing

- Does repetitive motion in a direction centralize or peripheralize symptoms? Does the opposite motion do anything
  - If there is **directional preference** then follow proper treatment plan described by Robin McKenzie.
- If no signs of centralization, then note if symptoms are irritable or not

Neuro Exam

- MMT and DTR testing of LE’s
  - Rule out neurological insult
  - If asymmetry exists....
    - Ensure there are no reports of bowel and bladder problems – Emergency!
    - Ensure neurological symptoms are not worsening

Special Testing

- Special Tests should be done for the lumbar spine, hip, thoracic spine and SI joint tests
  - Mainly for finding out where the pain is coming from
- Sensitive Tests are used to rule out
- Specific Tests are used to rule in

Special Tests – Lumbar Spine

- Sensitive
  - SLR (Sn = .91)
  - Extension Rotation Test (Sn = 1.0)
  - Prone Femoral Nerve Test (Sn = .84)

Special Tests – Lumbar spine

- Specific
  - Cross over SLR (Sp = .88)
  - Repetitive Motion Testing (Sp = .94) as described before
  - Passive Lumbar Extension Tests (Sp = .90)
  - Neuro exam is specific
Special Tests – SI joints

- Test Cluster
  - Distraction Test
  - Compression Test
  - Thigh Thrust Test
  - Gaenslen’s
  - Sacral Thrust
- 3 of 5 positive tests shift the likelihood of the pain producer being the SI joint by 27.9 times

Special Tests – Hip Joint

- Sensitive Tests
  - Piriformis (Sn = .88)
  - Impingement (Sn = .94)
  - Flexion, Adduction, Axial Compression (Sn = 1.0)
  - Scouring test (??)
- Specific Tests
  - FABRE (Sp. = 1.0)

Treatment Based Classification System for low back injuries

- If it is indicated that the source of the pain is in fact the lumobosacral spine utilization of TBC is warranted

Clinical Prediction Rules for Determining Efficacy of Stabilization Program

- Factors Predicting Success from Spinal Stabilization Program
  - Age < 40 years
  - Abnormal movement during sagittal lumbar ROM
  - SLR > 91 degrees
  - Positive prone instability test
  - Participants w/ 3 or more of the predictor variables had a greater likelihood of deriving a benefit from stabilization (+ LR = 4.0)

Clinical Prediction Rules for Determining Efficacy of Stabilization Program

- Factors Predicting Failure from Spinal Stabilization Program
  - Fear Avoidance Beliefs Questionnaire: Activity Subscale Score < 9
  - Negative Prone Instability Test
  - Absence of hypermobility when assessed w/ posterior to anterior pressure
  - Absence of abnormal movement during sagittal lumbar ROM
  - People who possessed at least 3 of these negative factors were not likely to benefit from stabilization intervention (+LR = 18.8)
Minimal Criteria for Safe Return to Sport

• Good clinical Exam
• SFMA Top Tier Tests are Functional and Non-painful
• FMS with no 0’s, 1’s, or asymmetries
• UEYBT with no asymmetries greater than 4 cm and within sport /age / gender established norms if available for Comprehensive Score

Good Clinical Exam

• Full AROM of LE
• 5/5 strength of LE
• No remarkable pain at rest
• Adequate time for healing of injury

• This is where most rehabilitation professionals stop
   — This is not enough!

Functional Movement Screen

• Seven Movements which are graded from 3-0 — plus 3 special tests
• Designed as a screening tool performed on individuals without recognized pathology
• Purpose is to demonstrate movement limitations and asymmetries
• Not a diagnostic tool

Functional Movement Screen

• Overhead Deep Squat
• Hurdle Step
• In-line Lunge
• Shoulder Mobility
• Active Straight Leg Raise – ASLR
• Stability Push-Up
• Rotary Stability

• 0-3 Score on each test
• 21 points score in total

FMS Score

• 3 – perform movement as described
• 2 – able to complete the movement pattern with a compensation
• 1 – unable to complete the movement
• 0 – remarkable / concordant pain with movement
Functional Movement Screen

• Perform a few weeks before discharge
• What are we looking for?
  – No asymmetries
  – No 0’s (pain with testing)
  – Total over 14

Pain – what exactly qualifies?

• It is not...
  – Reports of muscle soreness
  – Reports of muscle tightness
  – Fear of movement

• It is...
  – Reports of joint discomfort
  – Comparable or concordant sign
  – A legitimate red flag

• If movement causes pain the Functional Movement Screen is over!

The effect of pain

Injury → Pain → Altered Motor Control

Asymmetries

• Strength
• Flexibility
• Alignment
• ROM
• Joint Laxity
• Balance

FMS Scoring Sheet

<table>
<thead>
<tr>
<th>Screen</th>
<th>Raw Score</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead Deep Squat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurdle Step</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Line Lunge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder Mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoracic Stability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lumbar Stability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Straight leg raise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trunk Instability Push up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forearm Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total 14
### FMS Scoring Sheet

<table>
<thead>
<tr>
<th>Screen</th>
<th>Raw Score</th>
<th>Final Score</th>
<th>Left/Right Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Squat</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hurdle Step</td>
<td>2 / 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>In-Line Lunge</td>
<td>2 / 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Shoulder Mobility</td>
<td>2 / 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Impingement Test</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Active Straight Leg Raise</td>
<td></td>
<td>1 / 2</td>
<td></td>
</tr>
<tr>
<td>Trunk Stability Push-up</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Press-up Test</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Rotary Stability</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Child’s Pose</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

Return to Sport Testing for UE by Albi Gilmer, PT

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### How do we prioritize?

- 0 on section of FMS – continue traditional rehabilitation
- Asymmetries take priority over 1’s
- The group of the last 4 movements take priority over the group of the first 3 movements
- **Time for CORRECTIVE EXERCISES**

### What are Corrective Exercises?

- CEs focus on a movement or postural imbalance by
  - Improving mobility of one or all parts of a movement pattern
  - Improving neuromuscular stability so AROM is increased.
- CEs often require vetting by doing SFMA and / or FMS
- CEs often look *weird*
- Often are gravity-eliminated or gravity-assisted

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### Shoulder Sweep

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### Rib Pull

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**4/13/2016**
Clinical Reasoning

• #1 Cause for re-injury
  — Prior Injury
    • Non-modifiable risk factor
• #2 Cause for re-injury
  — Asymmetries
    • Modifiable risk factor

Calculation for Composite Score on UQYBT

\[
\text{Medial} + \text{Superolateral} + \text{Inferolateral} \times 3 \times \text{Limb Length} \times 100
\]

Overall Test Performance

Progression to Football

Once the player understands neutral spine / proper body mechanics progress to useful football movements.

1. Add lower body plyometric movements (jumping squats, box jumps)
2. Add weight throwing w/ forward squat jumping in open field
3. Add upper body plyometric movements – "falling pushup" from knees
4. Add shoving teammates straight on then from varying angles
5. Add blocking sled
6. Add blocking teammates
Expectations

- Clinical Instability is typically slow-changing... don’t expect sudden changes with rehabilitation exercises.
- Reducible disc injuries are typically very quick to change.
- Irreducible disc injuries are typically very limiting in ROM and are not very quick to change.

Prevention

- No setbacks!
  - Educate the player in proper body mechanics for ADLs and exercise
  - Educate the player in proper sitting and standing posture
  - Educate the player in the signs and symptoms that typically indicate that he is doing too much, too soon.

Conclusion

- Specific exercises are warranted for successful treatment of disc injuries and lumbar instability in football players
- Progress from basic centralization movements or basic stabilization exercises to restoration of function and education in prevention.

Supportive Research Supporting Centralisation and its Use in Evaluation of L-Spine

- Donelson R, Aprill C, Medcalf R, Grant W.; A prospective study of centralisation of lumbar and referred pain. A predictor of symptomatic discs and annular competence. Spine; May 15;22(10):1115-22, 1997. 63 chronic patients received a mechanical evaluation and discography, with clinicians blind to the findings of the other assessment. Centralisation (74%) and peripheralisation (69%) were strongly associated with discogenic pain, compared to no change in symptoms (12%). Centralisation (91%) was strongly associated with a competent annulus versus peripheralisation (54%).

- Werneke MW, Hart DL.; Categorizing patients with occupational low back pain by use of the Quebec Task Force Classification system versus pain pattern classification procedures: discriminant and predictive validity. Phys Therapy; Mar;84(3):243-54, 2004. Re-analysis of previously collected data comparing different methods of classifying back pain patients for their ability to predict outcome. QTF 3 or 4 predicted high levels of pain and disability at intake, but only centralisation / non-centralisation categories predicted pain and disability at discharge. Non-centralisation was stronger predictor of work status at 1 year than fear-avoidance. Predictive value of centralisation / non-centralisation stronger when followed through rehabilitation period, than just at intake.
Supportive Research Supporting Centralization and Its Use in Rehabilitation of L-Spine

- Long A, Donelson R, Fung T; Does it matter which exercise? A randomized control trial of exercises for low back pain. Spine; Dec 1;29(23):2593-2602, 2004. Following a mechanical evaluation all patients who demonstrated directional preference (DP) (230/312, 74%) were randomized to receive exercise matched to DP (1), exercise opposite to DP (2) or evidence-based management (3). Over 30% of groups 2 and 3 withdrew because of failure to improve or worsening, compared to none in group 1. Over 90% of group 1 rated themselves better or resolved at 2 weeks, compared to just over 20% (group 2) and just over 40% (group 3). There were further significant differences between the groups in back and leg pain, functional disability, depression and QTF category.

- Alexander AH, Jones AM, Rosenbaum Jr D H; Non-operative Management of Herniated Nucleus Pulposus: Patient Selection by the Extension Sign-Long term Follow-up. Orthopedic Review; 21:181-188, 1992. Follow-up study of 33/73 patients with acute disc herniation treated conservatively. Those unable to gain extension by 5 days were treated surgically. Ability to regain extension was a better predictor of outcome than a variety of other clinical and neurological signs and symptoms.

- This study showed that patients who had a confirmed lumbar herniated disc with loss leg strength and/or sensation, achieved a successful non-operative resolution with appropriate therapy if they could centralize their symptoms and achieve full passive extension. The results showed that 91% of persons who achieved this were able to avoid surgery at 5 year follow-up.

Supportive Research – Prevention of Lumbar Disc Injuries

- Larsen K, Welzl K, Lebow T-C; Can passive prone extensions of the back prevent back problems? A randomized, controlled intervention trial of 314 military conscripts. Spine; Dec 15;27(24):2747-52, 2002. 314 male conscripts randomized into 2 groups: one group received theory session based on TYOB, disc model, tape to back, and instructed to do 15 EIL X 2 a day for period of military duty. 214 (68%) completed follow-up at 12 months. 1-year prevalence LBP in experimental group 33%, compared to 51% in control. Numbers seeking medical help for LBP also significantly less (9% to 25%). In those who had reported LBP at baseline 1-year prevalence 45% to 80%.

Stabilization Program – Research

- Co-contraction of TA and Mf as little as 25% of maximal voluntary contraction can cause increased joint stabilization – Anderson and Winters (1990)

- Fine wire and surface EMG studies have shown that those who suffer from LBP had delayed muscle activation in their primary stabilizers with extremity movement – Hodges and Richardson (1995)

- The same study also showed delayed contraction did not reverse itself if back pain was gone.

- Results of training were better when under supervision of a professional - Leibenson (1999)