Methods for Manual and Self-Stretching of the Posterior Shoulder Region

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Sunday, October 25, 2015
11:00am-11:55am

OBJECTIVES

1. Discuss glenohumeral internal rotation deficit and its association with shoulder conditions.
2. Current evidence for stretching of the posterior shoulder region and the dosing of therapeutic exercise will be reviewed.
3. Describe the various manual and self-stretching stretching techniques for the posterior shoulder region.
4. Demonstrate and practice the stretching techniques for the posterior shoulder region with emphasis on manual stretching of the posterior shoulder.
5. Mobility exercises for the posterior shoulder region will also be discussed.

Posterior Shoulder Anatomy
Shoulder Symptoms

• The top 4 reasons given by patients for visiting orthopedic surgeons were:
  – Knee symptoms
  – Shoulder symptoms
  – Postoperative visit
  – Back symptoms
  – (CDC, 2010)

Glenohumeral Internal Rotation Deficit

• Loss of internal rotation
  – “The loss in degrees of glenohumeral internal rotation of the throwing shoulder compared with the nonthrowing shoulder” (Burkhart et al., 2003).
  – Most often discussed in the context of the overhead thrower

• Potential causes
  1. Bony changes in the glenohumeral joint
  2. Posterior shoulder muscle tightness secondary to increased deceleration forces of the arm during follow through
  3. Posterior capsule tightness from repetitive microtrauma during the late cocking and follow through phases of throwing
    • (Salamh et al, 2015).

• Burkhart et al introduced the concept of GIRD in their article on the Disabled Throwing Shoulder. (Burkhart et al., 2003)
Disabled Throwing Shoulder

“Dead arm”
- Unable to throw with preinjury velocity and control
- Pain and subjective unease in the shoulder
- Usually relates to late cocking and early acceleration phase of throwing sequence
- Associated with SLAP lesions
  - (Burkhart et al., 2003)

Contributing factors to “Dead arm”
- Tight posterior inferior capsule
  - GIRD
  - Posterosuperior shift of the GH rotation point
  - Increased sheer stress applied to the posterosuperior glenoid labrum
- Peel-back forces in late cocking that cause SLAP lesion
- Hyperexternal rotation
- Scapular protraction
  - (Burkhart et al., 2003)

GIRD & Shoulder Conditions

GIRD may be a contributing factor to the following shoulder conditions:
- Impingement (external/Internal)
- SLAP lesion
- Anterior instability

Bony Adaptations

Humeral retroversion & Glenoid retroversion
- Associated with GIRD.
- Occurs in young pitchers
  - Forces across the physis lead to a twisting of the bone and an increase in retroversion
- Allows an increase in the effective external rotation of the shoulder before the humerus reaches its physiologic limit
- Protective mechanism
  - (Tokish, 2014)
Posterior shoulder muscle tightness

- Deceleration strains observed in the follow-through phase of pitching can lead to muscle stiffness – (Tokish, 2014)
- Acute change

Posterior capsular tightness

Pathomechanics of the deceleration of the overhead throw

- Requires forceful eccentric contraction of posterior rotator cuff muscles
- If posterior rotator cuff cannot decelerate the arm, then the posterior capsule may be required to absorb the remainder of the energy.
- Cyclical loading combined with poor dynamic stability causes a continuous cycle of repetitive microtrauma and tissue healing, leading to hypertrophied posterior capsule – (Thomas et al, 2011)

Obligate Translation

- Tightening of the posterior portion of the glenohumeral capsule causes anterior and superior translation of the humeral head with passive shoulder flexion.
- Decreased subacromial space
- Compression of tissues
- Limited and symptomatic shoulder flexion, IR, horizontal adduction
GIRD in overhead athlete

• “Rather uniform increase in external humeral rotation usually with a concomitant decrease in internal rotation in the pitching arm”
• (Kings et al., 1969; Tokish, 2014)

Loss of internal rotation in general population

• Proximal migration of the humerus on the glenoid while the arm is at rest is regarded as a sign advanced RC disease.
• Excessive superior-anterior translations of the humeral head with active arm elevation.
• Shortening of posterior-inferior GH capsule.
• Decreased RC muscle performance.
• (Saitsu et al., 2011)

2 Types of Glenohumeral Internal Rotation Deficit

<table>
<thead>
<tr>
<th>Type of GIRD</th>
<th>IR</th>
<th>ER</th>
<th>TROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anatomical GIRD</td>
<td>Loss of IR &lt;18°-20°</td>
<td>Adequate ER gain</td>
<td>TROM within 5° of the uninvolved side (symmetrical TROM)</td>
</tr>
<tr>
<td>2. Pathologic GIRD</td>
<td>Loss of IR &gt;18°-20°</td>
<td>ER deficit</td>
<td>Loss of TROM &gt;5°</td>
</tr>
</tbody>
</table>

IR = Internal Rotation; ER = External Rotation; TROM = Total Rotational Motion (Manske et al., 2013)
GIRD Summary

- Not all GIRD is pathologic.
- GIRD is not related to any single type of injury.
- GIRD is a common finding in overhead athletes.
- External rotation deficiency (ERD) may be a predictor of future shoulder injury.
- Problems can occur when the amount of the GIRD exceeds the ERG (GIRD:ERG ratio > 1.0).
- Loss of TROM is predictive of future injury to the shoulder in professional athletes.
- Increasing TROM exhibited a higher correlation to shoulder injuries than GIRD.
- If the TROM is equal bilaterally, treatments designed to increase IR motion are not recommended.

(Manske et al, 2013)

Impairments Associated with Posterior Shoulder Tightness

- Decreased “shoulder” internal rotation ROM
- Decreased “GH” IR ROM
- Decreased “shoulder” horizontal adduction ROM
- Decreased “GH” horizontal adduction ROM
- Hypomobile posterior glide

“We could not say with any certainty whether the side with lesser motion was lacking flexibility or if the side with greater motion was showing excessive flexibility.”

Assessment

Shoulder Motion vs. Glenohumeral Motion
Internal Rotation in Frontal Plane

Internal Rotation in Scapular Plane

Internal rotation in the open pack position

Measurement of GH ER motion
(Manske et al., 2013)

1. Patient in supine
2. Shoulder at 90 degrees of abduction
3. Humerus in the plane of the scapula (10-15° anterior to the coronal plane). Nest the humerus on a towel roll.
4. Elbow flexed to 90°
5. Start with forearm vertical.
6. The examiner passively ER the GH joint while maintaining stabilization of the scapula via gentle palpation of the coracoid process, to feel for motion, and minimize scapulothoracic contribution or compensatory movement.
7. When the scapula begins to move into retraction and or posterior tilt, the measurement should be taken.
Measurement of GH IR Motion
(Manske et al., 2013)

1. Patient supine
2. Shoulder at 90 degrees of abduction
3. Elbow fixed to 90°
4. Start with forearm vertical.
5. The examiner passively IR the GH joint while maintaining stabilization of the humerus in the plane of the scapula (10-15° anterior to the coronal plane), to feel for motion, and minimize scapulothoracic contribution or compensatory movement.
6. When the scapula begins to move into protraction and or anterior tilt, the measurement should be taken.

Glenohumeral Internal Rotation Measurements Differ Depending on Stabilization Techniques

Wilk et al., 2012

AAOMPT Conference 2015

2 groups of asymptomatic overhead athletes:

<table>
<thead>
<tr>
<th>Group 1: 39 male professional baseball players (mean age, 27.4 ± 1.3 years; mean height, 191.8 ± 5.6 cm; mean weight, 93.4 ± 10.4 kg; 32 pitchers) (Wilk et al., 2012)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Humeral Head Stabilization</th>
<th>Scapular Stabilization</th>
<th>No Stabilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>52.3 ± 8.4°</td>
<td>51.5 ± 11.3°</td>
<td>51.8 ± 11.0°</td>
</tr>
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</table>

AAOMPT Conference 2015
Reliability of 3 methods of measuring internal rotation.

**Group 1:** 20 males (mean age, 27.66 years; mean height 170±7cm; mean weight 72±15 kg) (Wilk et al., 2012)

<table>
<thead>
<tr>
<th>Method</th>
<th>Internal Rotation (mean)</th>
<th>Intrarater ICC</th>
<th>Interrater ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stabilization</td>
<td>58°</td>
<td>0.48</td>
<td>0.47</td>
</tr>
<tr>
<td>Scapular stabilization</td>
<td>46°</td>
<td>0.62</td>
<td>0.43</td>
</tr>
<tr>
<td>Humeral head stabilization</td>
<td>40°</td>
<td>0.51</td>
<td>0.45</td>
</tr>
</tbody>
</table>

A statistically significant difference was observed between each method of stabilization (p<.001).

**Correlation between stabilization techniques**

**Dominant shoulder of group 2. (p<.001)** (Wilk et al., 2012)

<table>
<thead>
<tr>
<th>Method</th>
<th>No stabilization</th>
<th>Scapular stabilization</th>
<th>Humeral head stabilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stabilization</td>
<td>0.792</td>
<td>0.729</td>
<td></td>
</tr>
<tr>
<td>Scapular stabilization</td>
<td>0.792</td>
<td>0.940</td>
<td></td>
</tr>
<tr>
<td>Humeral head stabilization</td>
<td>0.729</td>
<td>0.940</td>
<td></td>
</tr>
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**Nondominant shoulder of group 2. (p<.001)** (Wilk et al., 2012)

<table>
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<th>Humeral head stabilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stabilization</td>
<td>0.835</td>
<td>0.840</td>
<td></td>
</tr>
<tr>
<td>Scapular stabilization</td>
<td>0.835</td>
<td>0.899</td>
<td></td>
</tr>
<tr>
<td>Humeral head stabilization</td>
<td>0.840</td>
<td>0.899</td>
<td></td>
</tr>
</tbody>
</table>
10/20/2015

Resulted in the greatest amount of IR
- Scapula motion is minimal from treatment table
- Scapula anterior tilt and protraction will result in greater “shoulder” IR ROM
- This pure IR motion, not compensatory motion or glenohumeral motion

Stabilization of scapula
“C” technique

(Wilk et al., 2012)

Measurement of GH Horizontal Adduction

GH H-ADD without scapular stabilization
GH H-ADD with scapular stabilization

Measurement of GH Horizontal Adduction

Side lying method with scapular stabilization
Assessment: Glenohumeral Motion

- Vigor of measurement technique (SINSS)
- Comparison: Apples to apples
- Discipline in the cognitive and psychomotor skills of assessment of joint motion
- Practice

  - "A joint’s movements can never be classed as normal unless firm over-pressure can be applied painlessly"
  - “During examination and assessment pain should never be considered without relation to range nor range without relation to pain”
  - Maitland 1991

Intervention for Posterior Shoulder Tightness

- “The scientific and clinical rationale behind managing the hypomobile shoulder is predicated on treating soft tissue in order to create a plastic deformation response” (Manske et al., 2013).
- Physical Stress Theory (Mueller & Maluf, 2002)

Manual stretching of the posterior shoulder

- Horizontal Abduction without Scapular Stabilization
• Identify lateral scapular border
• Add horizontal abduction (Critical)
• Stabilize scapula
• Avoid excessive skin tension
• Maintain scapular stabilization
• Add horizontal adduction
• May use body to maintain humerus position during stretch

• Start with patient in horizontal abduction with scapular retraction
• Stabilize Scapula
• Maintain scapular stabilization as patient self-stretches into horizontal adduction

Self-stretch horizontal adduction at wall
Sleep stretch v. Cross body stretch  
(Wilk et al., 2013)

Internal Rotation Motion
• Cross body > Sleep stretch (McGure et al., 2007)
• Cross body stretch + joint mobilization (Manske et al., 2010)
• Manual H-ADD with scapular stabilization > Manual H-ADD (Salamh et al., 2015)
• Sleeper stretch (Laudner et al., 2008)
• Sleeper stretch (Maenhout et al., 2012)

Horizontal Adduction Motion
• Manual H-ADD with scapular stabilization > Manual H-ADD (Salamh et al., 2015)
• Sleeper stretch (Laudner et al., 2008)
• Sleeper stretch (Maenhout et al., 2012)

Side lying Horizontal Adduction Self Stretch
Active Horizontal Adduction without & with scapular stabilization

Use the new range
Gain neuromuscular dynamic control over the newly gained ROM (Manske et al., 2013).
Don’t forget regional interdependence

- Glenohumeral joint
- Scapulothoracic motion
- AC joint
- SC joint
- Spine
- Hips
- Supination

A technique is the brainchild of ingenuity.
(Maitland, 1991, p8)

“Although it is necessary to have a basis of technique from which to teach, the clinician must be totally open minded and capable of adapting and modifying techniques to achieve the purposes for which they were chosen in relation to movement and pain” (Maitland, 1991, p8).

References

References