Rehabilitation of Overuse Shoulder Injuries in Adolescent Overhead Athlete

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Objectives

• Incidence in shoulder adolescent injuries
• Common overhead sport injuries myth or truth
• Evaluation and treatment through case example
Incidence

- 45 million adolescents in US participate in organized youth athletics
- Little League baseball recorded more than 2.6 million participants in 2007
- Estimated over 5 million swimmers in High School and Summer League
- Growing trend for single sport year around athletics

What Does the Research Say? “BASEBALL”

• Physis widening proximal humerus shown radiographically in 8-15 yo throwers
• CT scans have shown retroverted humeral head shift in dominate arm throwers post puberty
• Cohort study of 476 pitchers (9-14 yo) demonstrated ½ had shoulder or elbow pain
• 52% increase in risk shoulder pain with throwing curveballs
## What Does the Research Say? "BASEBALL"

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastball</td>
<td>8</td>
</tr>
<tr>
<td>Change up</td>
<td>10</td>
</tr>
<tr>
<td>Curve Ball</td>
<td>14</td>
</tr>
<tr>
<td>Knuckle Ball</td>
<td>15</td>
</tr>
<tr>
<td>Slider</td>
<td>16</td>
</tr>
<tr>
<td>Fork ball</td>
<td>16</td>
</tr>
<tr>
<td>Screw Ball</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Max Pitches/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-18</td>
<td>105</td>
</tr>
<tr>
<td>13-16</td>
<td>95</td>
</tr>
<tr>
<td>11-12</td>
<td>85</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
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Andrews www.asmi.org, Little league implementation of rules
What Does the Research Say?

“Swimming”

- Cole reported 30% shoulder injury rate out of 325 swimmers over 1 year (96-97)
- Bak et al reported a 38% incidence of shoulder injuries per year in swimmers
- Pink et al reported a 47% lifetime incidence of shoulder injuries in collegiate swimmers and a 48% in masters swimmers
- Yanai and Hay showed that 40% of impingement occurs during recovery, 40% at entry, 20% during the pull
Shoulder Injuries

- Instability causing secondary impingement
- TOS
- Physis injuries
Laxity and Adolescents

- Emery, MullaJi tested asymptomatic males and females for shoulder instability
- Mean age (14.4, 16.6)
- Found instability in greater than ½ with load and shift testing
Impingement

- Repetitive Stress
- Chronic Microtrauma
- Anterior inferior Laxity
- Secondary Impingement

- Jobe 97
Impingement

• Sein ML BJSM 2008
• 86 elite swimmers
• Training questionnaire, laxometer, MRI, PE
• Laxity correlated with impingement, pain and ER pain
• 69% MRI positive SS tendonapathy which correlated level of training (hrs/wk, years swimming
• Increase risk > 15 hrs/wk
Impingement

- Borsa AJSM 2005
- 42 NCAA D1 swimmers, 44 age matched controls
- 67% swimmers hx. Shoulder pain
- US measure laxity under stress
- No difference between painful and non painful swimmers
- No Difference between swimmers and age matched controls
TOS

• Most research on Adults with incidence .3-2%
• Increase in vascular incidence with kids vs. adults
• Very rare in general population
• ? In overhead athlete

Maru et al Euro soc Vasc Surg 2009
Physis Injury

- Little leaguer’s shoulder
- Torsion overload injury
- Can widening of physis on radiographs
- Ave age 14 yo
- Much more common in throwers that throw year around
- Ave. 3 months of rest prior to asymptomatic
Onset of Pain

- How does it vary/similarities with each condition
- Insidious vs. acute
- Sport
- Does it fit with the DX given?????
- Do resolved symptoms return, or do new symptoms occur in the course of treatment
Primary Symptom Investigation

• Do the symptoms fit a pattern, or is the description atypical?
Mechanism of Injury

- Traumatic vs. a traumatic
  - Velocity
  - Repetition
- Exact position of the injury
  - Crucial in determining tissue involved
- What was felt?
- What was heard?
- What was done?
  - Able to continue?

- Sport
- Position/stroke
- When does it hurt
- What is their volume
What are we evaluating?

- From the ground up!
- What is shortened, what’s lengthened
- What is found at the pelvis/lumbosacral
- What is found at thoracic spine, scapula
- What is found at c-spine
Biomechanics
Biomechanical Swimming Stroke Flaws

Straight Arm Pull

- Physical Outcome
  1. Anterior laxity
  2. Increase lever arm to force arm into impingement
  3. Radicular symptoms
- Physical Cause
  1. Want to push against buoyancy
  2. Decrease IR
  3. Poor momentum
  4. Week IR
  5. Poor Drill
Drill

- Must have purpose
- Not to drill poor movement
- Design to aid in motor development and movement
- Neuromuscular Re-Ed
Treatment PEARLS

• Treat what you find
• Think of the demands of your athlete
• Make sure your treating What you think you are
• Apply knowledge of sport biomechanics
• Remember Nuermuscular re-education
Rehab Success

• Understanding sports biomechanics
  – Drives evaluation
  – Drives movement assessment
  – Drives Treatment
  – Drives neuromuscular re-education
  – Drives Success