Introduction

The Shoulder Was Not Made To

- Throw a Ball 95 mph in 50ms
- Hit a Tennis Ball 150 mph
- Repetitive Forceful Motions

Introduction

- 2nd Most Commonly Injured Location in Tennis & Baseball

Introduction

- PreParticipation Exam
  - Only the History Is Considered Helpful
  - But Shoulder Different
  - Bony & Soft Tissue Adaptations Occur
  - PE Can Detect & Identify Those at Risk
  - Prevent injury

Introduction

Consequence of Shoulder Injury

- 13% of all Minor League Baseball Pitchers Make It To The Major Leagues
- If Minor Leaguer Gets Shoulder Surgery, only 3% Make It To The Major Leagues

Keith Meister, Personal Communication

Shoulder Injury Factors

Factors at Play

- Pitch Count
- Pitch Type
- Mechanics
- Conditioning
- Genetics

- We Can Control 1-4
## Biomechanics

### Athletics

- More ER
- Greater Arc Over Which To Accelerate the Arm, Ball or Racquet

## (Mal) Adaptations

### Anterior Laxity

- Anterior Labral Tears
- Rotator Cuff Overload
- Secondary Impingement

## Anterior Laxity

### Late Cocking Position

- Humeral Head Forced Out Anteriorly

### Late Cocking Position

- Humeral Head Forced Out Anteriorly
- Stretch Anterior Capsulo-ligamentous Structures
- Injure Anterior Labrum

## Anterior Laxity

### Late Cocking Position

- Anterior Laxity
- Increased Reliance On Rotator Cuff For Stability
- Overload Cuff

### Rotator Cuff Overload

- Fatigue
- Dysfunction
- Inflammation
Secondary Impingement

- Cannot Maintain Humeral Head In Glenoid
- Deltoid Pull

Treatment

- Rotator Cuff Strengthening

(Mal) Adaptations

Increased ER / Decreased IR

- Humeral Retroversion
- Posterior Capsular Tightness
- Anterior Capsular Laxity

Follow Through

- Posterior Muscles
  - Joint Distraction
  - Slow Rotation
  - Dissipate Remaining Stored Energy
  - Overload
  - Scar – Tendon / Capsule-Ligament

GIRD → Post Sup Impingement

Posterior Capsular Tightness

- (Mal) Adaptations
  - GIRD
  - Internal Impingement
  - SLAP Lesions
  - SSN Injury
(Mal) Adaptations

Posterior Capsular Tightness

- **GIRD**
  - Internal Impingement
  - SLAP Lesions
  - SSN Injury

GIRD → SLAP

GIRD → SSN Entrapment

Prevention

**Jobe’s Exercises**

- Strengthen ER
- Reduce Posterior Cuff Inflammation
- Reduce Scarring
- ? Reduce GIRD
- Reduced Injury

Tight Posterior Capsule

Sleeper Stretch

- 90 Deg
- 70 Deg
- 110 Deg

 Courtesy of Kevin Plancher, MD
Concentrate on Subscap

- Cadaveric Studies
- Simulated Late Cocking
- Subscap Weakness
  - Increased MER
  - Increased GH Contact
  - Cuff Overlap Glenoid Rim @ 30° – 40°
- Also, More Extension Results in Incr Pressure

SICK Scapula

- Scapular Malposition
- Inferior Medial Scapular Border Prominence
- Coracoid Pain & Malposition
- DysKinesia of Scapula Movement
- Droop

Serratus Anterior Dysfxn

- Instability
- Weakness
- Secondary Outlet Impingement

Scapular Dyskinesis

- Rehab
- Rehab
- Rehab
- Scapular Stabilizers

Prevention

- Core Strength to Reduce UE Stresses

Mihata, et al, AJSM 2009 & 2010

Courtesy of W Benjamin Kibler, MD

Core Strength to Reduce UE Stresses
Prevention

- **Conditioning** to Maintain Normal Mechanics
  - Study: Upright When Fatigued
  - Arm Lag

Prevention

- **Pitching Volume / Counts**
  
<table>
<thead>
<tr>
<th>Age (y/o)</th>
<th>Max Pitches per Game</th>
<th>Max Counts per Week</th>
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<tbody>
<tr>
<td>9-10</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>11-12</td>
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<td>15-16</td>
<td>90</td>
<td>2</td>
</tr>
<tr>
<td>17-18</td>
<td>105</td>
<td>2</td>
</tr>
</tbody>
</table>

Prevention

- **Rest Between Pitching Outings**

Prevention

- **Pitching Mechanics**

Prevention

- **Pitch Types**
  - Avoid Curveballs Until 13 y/o
  - Avoid Sliders Until 17 y/o

Prevention

- **Pitch Types**
  - Avoid Curveballs Until 13 y/o
  - Avoid Sliders Until 17 y/o

- **Serve Types**
  - Avoid Kick Serve Until ???
Conclusion

- Shoulder Injuries are Common in Baseball & Tennis
- Shoulder Injuries Can (& Do) End Careers in Baseball & Tennis
- Many Causative Factors For Shoulder Have Been Identified
- Many Factors Can Be Detected on a PPE & Are Modifiable

Mal-Adapations

- Not Correctable
  - Osseous
- Correctable
  - GIRD
  - Pect Minor Tightness
  - Cuff Weakness
  - Scapular Dyskinesis
  - Conditioning

Don’t Forget The Core

Conclusion

- Pitch Counts
- Pitch (& Serve) Types
- Pitching Mechanics
- Conditioning

Thank You