ELBOW REHABILITATION

Keely Battaglini, PT, SCS, ATC
Courage Kenny Sports & Physical Therapy - Eagan

July 7, 2017

DISCLOSURE

• I have no disclosures

OBJECTIVES

• Attendees will be aware of research regarding physical therapy treatment of various elbow pathologies
• Attendees will understand various treatment techniques/theories for physical therapy management of lateral epicondylosis and medial elbow pain in overhead athletes.

Physical Therapy Management

• Elbow pain in overhead athletes
• Medial elbow pain/injuries
  • UCL
  • Little league elbow
• Posterior elbow pain/injuries
  • Valgus extension overload/Posteromedial impingement
• Lateral epicondylosis
Elbow Pain in Overhead Athlete

Little league elbow: Apophysitis

UCL

Valgus Extension Overload

Treatment of overhead athletes

- Prevention: pitch count; MLB pitch smart

<table>
<thead>
<tr>
<th>AGE</th>
<th>DAILY MAX (PITCHES IN GAME)</th>
<th>REQUIRED REST (PITCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 Days</td>
<td>1 Days</td>
</tr>
<tr>
<td>7-8</td>
<td>50</td>
<td>1-20</td>
</tr>
<tr>
<td>9-10</td>
<td>75</td>
<td>1-20</td>
</tr>
<tr>
<td>11-12</td>
<td>85</td>
<td>1-20</td>
</tr>
<tr>
<td>12-13</td>
<td>95</td>
<td>1-20</td>
</tr>
<tr>
<td>13-14</td>
<td>95</td>
<td>1-20</td>
</tr>
<tr>
<td>15-16</td>
<td>105</td>
<td>1-30</td>
</tr>
<tr>
<td>17-18</td>
<td>120</td>
<td>1-30</td>
</tr>
<tr>
<td>19-22</td>
<td>120</td>
<td>1-30</td>
</tr>
</tbody>
</table>
Prevention

Risk Factors for shoulder and elbow injuries in throwers:

Pitching/throwing too much:
- Pitching > 8 mos = 5X more likely to require surgery
- > 100 innings per year = 3.5X more likely to be injured
- High pitch counts
- Following recommendations reduces risk of injury by 50%
- Pitching for multiple teams
- Catching as 2nd position = 2.7X more likely to be injured
- Pitching on consecutive days = 2.5X risk of pain

Other factors:
- Pitching while fatigued
- Those who require surgery: 36X more likely to routinely pitch fatigued
- Pitching at higher velocities
- Pitching with GIRD

Prevention

• Prospective cohort study of 353 junior baseball players (6-12) with no h/o elbow pain
• Clinical exam, ultrasonography, measurements of B ROM of elbow flexion/extension, shoulder IR/ER, hip IR/ER. IR/ER strength of shoulder and scapular mm. Thoracic kyphosis angle in standing. Questionnaire.
• Followed for 12 months.
  - 78 players (22.1%) sustained medial elbow injury.
  - Age ≥9, pitcher, >100 throws per day, thoracic kyphosis angle ≥30°, elbow ext deficits ≥5° were significantly associated with medial elbow injury.


Prevention

• Prospectively measured ROM and strength on 101 HS pitchers
• 28 injuries (19 shoulder, 9 elbow)
  - Preseason supraspinatus weakness associated with increased risk of injury
  - Pitchers with no loss of IR increased risk compared to pitchers with ≥20 degree loss
  - Authors: inadequate prior exposure to pitching?

Prevention

- Prospectively looked at 296 professional pitchers over 8 years (505 examinations)
- 49 elbow injuries and 8 surgeries in 38 players
- NOT correlated to injury:
  - GIRD
  - GH ER insufficiency
- Increased risk for injury:
  - Deficits of > 5 degrees of total rotation (ER + IR) of throwing shoulder had 2.6X greater risk for injury
  - Deficits of ≥ 5 degrees of flexion on throwing shoulder had 2.8X greater risk for injury


Prevention

- Pre-season training program increased shoulder endurance while maintaining strength ratios and ROM throughout 20 week program
- 2 phase pre-season program
  - Strengthening of scapular, rotator cuff and forearm muscles that emphasized endurance over strength
  - Phase 1: weeks 1-10
    - Elastic resistance training twice a week
  - Phase 2: weeks 11-20
    - Weight room exercises twice a week
    - Machine and free weight
  - Through both phases:
    - 1 training session per week in sports medicine clinic with elastic resistance for shoulder/scapular muscles

(Moore SD, et al, Sports Health, 2013)

Prevention

- Posterior Shoulder Endurance Test (PSET) in repetitions:
  - Baseline: 30 ± 14
  - 4 weeks: 66 ± 26 *
  - 8 weeks: 80 ± 27 *
  - 20 weeks: 88 ± 36 *
  - * P < 0.001

(Moore SD, et al, Sports Health, 2013)

Treatment of Overhead Athlete

- We know that the load failure of the UCL is 34 Nm via cadaveric studies
- We also know that the forces during a pitch exceed that of the load failure (valgus torque reaching 64 Nm)
- Therefore, other factors must help reduce strain on these structures or we would tear UCL with each pitch
  - Kinetic Chain

©AllinaHealthSystem
Kinetic Chain

- Helps with load regulation
- Biomechanically efficient and optimal alignment for minimizing loads on the elbow
- Production of interactive moments to move and protect the elbow


Kinetic Chain

- Helps with load regulation
- In study of Olympic tennis players
  - Using less than 10 degrees of knee flexion in cocking phase of serve
  - Increased valgus load at elbow by 21% resulting in 73.9 Nm (above safe repetitive load level).


Kinetic Chain

Biomechanically efficient and optimal alignment for minimizing loads on the elbow.

- Example: Dropped elbow is considered the “kiss of death” during baseball pitching (elbow below shoulder height during acceleration phase).
- Pitching/throwing mechanics analysis

Kinetic Chain

Production of interactive moments to move and protect the elbow.

- 27 uninjured HS pitchers
- Looked at rotational ROM, peak isometric IR/ER strength and 3D pitching biomechanics
- Found inverse relationship between ER ROM and elbow adduction moment.
- Positive relationship between peak shoulder IR moment and peak elbow adduction moment
- Greater ER ROM may be protective of medial elbow injury
- Coupling between shoulder IR moment and elbow adduction moment

(Hurd WJ, J Athl Train, 2012)
### Evaluation of Kinetic Chain

- **Evaluation of proximal factors**
  - Hip and leg
    - Balance/proprioception: can they perform SLS
    - Stability: can they perform SL squat or step down
  - Hip ROM
  - Trunk
    - Adequate ROM
    - Functional abdominal strength

- **Shoulder**
  - Posture and resting scapular/shoulder position
  - Scapular dyskinesis
  - Adequate upward rotation, posterior tilt, external rotation of scapula?
  - Good eccentric control?
  - Serratus and lower/mid trap strength and recruitment
  - Total arc/range of motion (ER + IR = TRM )
  - Shoulder flexion
  - Elbow extension
  - should all be within 5 degrees of contralateral side
  - RTC/Periscapular strength

### Lateral Epicondylosis

- **Lateral epicondylosis**
  - 25-65 y/o with peak age: 42 years
  - ECRB 80% of time
  - Dorsal interosseous nerve entrapment (radial nerve)
  - Positive radial neurodynamic testing
  - Positive pain with resisted supination

- **Research: what works?**
  - Eccentrics
  - Deep transverse friction massage
  - Dry needling
  - Low level laser therapy
  - US/phonophoresis
  - Shock wave therapy
  - Multi-modal
**Eccentrics**

- Systematic review of RTC and CCT looking at eccentrics as treatment for lateral epicondylitis
- 12 studies met inclusion criteria
  - 3 were high quality
  - 7 were medium quality
  - 2 were low quality
  - 8 of the studies found that following treatment, all groups that included eccentric exercise reported decrease in pain, improvement in function, improvement in grip strength from baseline
  - 7 studies that compared groups that included eccentrics versus groups that excluded eccentrics found improvements in pain, function and/or grip strength
  - 1 low quality study looking at isolated effect of eccentrics found no significant improvement in pain compared with other treatments.

**Deep Transverse Friction Massage**

- Found 1 study on lateral epicondylitis that met criteria
  - 40 subjects with lateral elbow tendinitis and compared:
    - Deep TFM with US and placebo ointment (n = 11) versus US and placebo ointment (n = 9)
    - Deep TFM with phonophoresis (n = 10) versus phonophoresis only (n = 11)
  - No significant difference in 5 weeks for:
    - change in pain on VAS
    - grip strength
    - Function on VAS
    - Pain free functional index
    - Functional status

**Dry Needling**

- Four studies met inclusion criteria (2 were done on lateral epicondylitis)
  - Improvement in VAS of 34% (significant was > 25%) from baseline at 6 months
  - Improvement in VAS of 56% from baseline
  (Krey D, et al, Phys Sportsmed, 2015)

**Low Level Laser Therapy**

- Systematic review:
  - 5 trials of 904 nm lasers with doses from 0.5 to 7.2 Joules
  - Significantly improved pain relief and likelihood of global improvement compared with placebo
  - 3 additional RCT that used 904 nm laser
  - No benefit compared with comparator groups in the short term (comparison groups received active interventions, i.e. exercise)
  (Bjordal JM, et al, BMC Musculoskel Dis, 2008)
US/Phonophoresis

- US appears to be no more effective than placebo for pain relief or self-perceived global improvement in the short term.


Shock Wave Therapy

- 2005 Cochrane review looked at 9 placebo-controlled trials
  - SWT provides little or no benefit in reducing pain or improving function
    (Buchbinder R, Cochrane Database Sys Rev, 2005)
  - No difference in pain relief or function between SWT, US with friction massage and corticosteroid injection at any time
    (Gunduz R, et al, Clin Rheumatol, 2012)
  - No different to corticosteroid injection or autologous blood injections at improving pain or function at 12 weeks
    (Pturan KE, et al, Orthopedics, 2010)

Multi-modal

- Mulligan MWM and exercise
  - Pooled data (n = 205) revealed:
    - Physical therapy was superior to wait-and-see in providing a successful outcome in the short term (6-8 weeks).
    - At 52 weeks, there continued to be a significant (although small) benefit of physical therapy over wait-and-see in successful outcome.
    - Physiotherapy was similar to corticosteroid injection in successful outcome in short term.
    - Physiotherapy was superior to corticosteroid injection at 52 weeks for successful outcome.

(Coombes BK, et al, JAMA, 2013)
References


TO CONTACT ME

• Keely Battaglini, PT, SCS, ATC
  Keely.battaglini@allina.com
  612-775-2960

https://www.allinahealth.org

©AllinaHealthSystem