Rehabilitation of the Thrower's Elbow

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A Day in the Life

Objectives

- Review pertinent anatomy
- Discuss appropriate evaluation
- Manual therapy techniques
- Exercise prescription
- Returning to throw
Anatomy Review
  ▶ Bony Anatomy
  ▶ Ligamentous/Capsular Structures
  ▶ Upper extremity mm involvement with throwing

Elbow Anatomy
  ▶ Synovial Hinge Joint
  ▶ Three Joints
    ▶ Humeroulnar
      ▶ Extension and Flexion
    ▶ Humeroradial
    ▶ Proximal Radioulnar
      ▶ Supination and Pronation

Elbow Ligamentous Anatomy
  ▶ Medial UCL Complex
    ▶ Anterior Oblique
    ▶ Posterior Oblique
    ▶ Transverse
    ▶ Anterior Bundle has 3 Distinct Bands
      ▶ Anterior, Central, Posterior
      ▶ Primary Restraint to Valgus Stress
Phases of Throwing and Muscle Activation

- Seroyer et al; Sports Health 2010
- Calabrese; J SPT 2013

Pertinent Musculature

- Late Cocking
  - Max Valgus Torque
  - Counter varus torque generated by flexors and pronators
- Acceleration
  - Rapid extension (120-25°): Triceps
- Ball Release
  - Wrist flexion to neutral - Eccentric Wrist Extensors
- Deceleration
  - Triceps and Biceps acting as an extender elbow and pronating forearm

Rotator Cuff
- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis

Posterior Musculature
- Mid and Lower Trapezius
- Latissimus Dorsi
- Rhomboids

Anterior Musculature
- Pec Major/Minor
- Serratus Anterior
- Bicep
Clinical Examination

- Subjective History
- Range of Motion
- Joint Mobility
- Strength
- Scapular Control
- Special Tests / Diagnostic Imaging
- Lower Extremity / Core

Subjective History

- Location/length of symptoms?
- At what point during the throwing motion does pain begin?
- Previous injury/rehab?
- Pre/post pitching routine?
- Difficulty warming-up?
- Volume of sport activity?

Range of Motion Assessment

- Elbow
  - Active/Passive Extension and Flexion
  - Position of cubital fossa can lead to misleading interpretation
- Wrist
  - Extension and Flexion
  - Supination and Pronation
- Don’t forget to assess SHOULDER motion!
Range of Motion Assessment

- Is there more to ROM assessment than GIRD???
  - >20 deg diff; Morgan et al ’03
  - Manske et al; JSP ’13
- Total Arc = ER + IR
  - 2.3x inc. for injury when >5 deg deficit (Wilk et al.)
  - 130 ER + 30 IR = 160
  - 105 ER + 55 IR = 160
- Shoulder flexion w/ stabilized scap
- Elbow and Wrist Assessment

Joint Mobility Assessment

- Assessment of Elbow Joint Mobility
- Abnormal End-Feels:
  - Firm
  - Hard
  - Boggy
  - Empty
- Assess other joints
  - Shoulder, C-Spine, and T-Spine

Strength Assessment

- Test pertinent muscles involved in phases of throwing and compare bilaterally
  - RTC, Med/low trap, serratus anterior, etc.
- Manual muscle testing
- Hand-held dynamometry
  - Hayes et al. 2002
  - Donatelli et al 2000; JOSPT
Scapular Control/Position

- **Scapular Control**
  - Forward flexion assessment
  - Identify scapular dyskinesis with concentric and eccentric phases
  - Kibler et al; J Am Acad Ortho Surg '03

- **Scapular Position**
  - More protraction and anterior tilt vs. non-dominant scapula
  - Wilk, Reinold et al; CSM '07

Special Tests / Diagnostic Imaging

- **Special Tests**
  - Evaluate pertinent structures (i.e. UCL, Ulnar N.)
  - Ahmad et al 2012; Kancherla et al 2014

- **Imaging of the Throwers Elbow**
  - MRI Predictors of Failure w/ NonOp UCL Injury Management
    - Distal tears showed higher odds of failure
    - Frangiamore et al 2017
  - Pre-Season Elbow MRI in Little Leaguers
    - 35% had "abnormal" findings
    - Pennock et al 2016
  - Corroborate findings with clinical exam

Lower Extremity and CORE Assessment

- **ROM Assessment**
  - Inc. IR stance hip; Inc. ER stride hip
  - MuCulloch et al; Ortho J Sports Med '14

- **Neuromuscular control**
  - Chaudhari et al; AJSM '14
  - LE muscle strength
  - Abdominal strength
Manual Therapy Techniques

- Joint Mobilizations
- Passive ROM/Stretching
- Soft tissue techniques

Elbow Joint Mobilizations

- Elbow Flexion w/ Ulnar Gapping
- Elbow Extension w/ Forearm Distraction
- Radial Head Mobilizations

Elbow Passive ROM/Stretching

- Clinical Pearls
  - Avoid posterior symptoms with extension stretching
  - Change forearm position; add distraction
  - Avoid symptoms like “pulling” or “tightness” with flexion
    - Manual therapy mobilizations
  - Post-Op UCLR
    - Less is more; allow tissue healing
    - Neural inhibition
  - Post-Op Arthroscopic
    - Advance as tolerated
Soft Tissue Techniques

- Soft Tissue Massage
- Instrument Assisted
- Cupping

Self-Stretching Techniques

- Weighted elbow extension
  - Stretch should be felt over bic-cap anterior elbow...NOT POSTERIORLY !!!
  - Bicipital crease facing up
  - Limit humeral external rotation
  - Low load, long duration
- Weighted elbow flexion
  - No symptoms medially
  - Gentle posterior stretch
Self-Stretching/Mobility Exercises

- **Sleeper Stretch**
  - Consider modified stretch position
  - Wilk et al; JOSPT '13
    - Scapular plane - better stretch for posterior capsule
    - Decreased reports of symptoms associated w/ sub-acromial impingement
  - Communicate and education on location of appropriate stretch
  - AVOID ANTERIOR "PINCHING" !!!!

Self-Stretching/Mobility Exercises

- **Supine thoracic extension** over 1/2 foam roller
  - Inhale / raise arms
  - Exhale / lower arms
  - Spend more time at segment(s) that feel stiff/tight

Self-Stretching/Mobility Exercises

- **Numerous tools/foam rollers available**
  - Educate your patients!!
    - More is not always better
    - Tissue damage
    - Lasting pain response
Exercise Prescription

- Implement based on physical exam findings
- Forearm/Rotator cuff/Periscapular muscular strengthening
- OKC and CKC
- Neuromuscular stabilization
- Upper Body Plyometrics
- Core / Lower Extremity

Forearm Strengthening

- Rice Bucket
- Eccentric wrist extensor
- Thera-Web
- Cuff weights if limited gripping is desired
- Incorporate grip strengthening with arm care exercises
- PVC Pipe…Cheap and Easy!

Forearm Strengthening

Manual Extensor Eccentrics

PowerWeb @ Neutral

PowerWeb in Scaption
Rotator Cuff Strengthening/Activation

- Appropriate muscle activation is key!!!
- Verbal and Tactile Cues
- E-Stim (Russian)
- Modify exercise
- USE A TOWEL ROLL!!
- Optimal line of force production for mm.
- Adduct humerus w. ER (Graichen et. al)
  - Inc. EMG activity of cuff
  - Inc. sub-acromial space

Periscapular Muscle Strengthening

- “I-W-Y” Exercise
  - Challenging scapular strengthening/stabilization exercise
  - 2 for 1 --- Engages CORE

Periscapular Muscular Strengthening

- Prone Horizontal Abd. w/ ER
  - Focus on scapular control
  - Progress by inc. lever arm
  - Progress to rotating humerus at end-range
Neuromuscular Stabilization
- Role in dynamic shoulder stability
  - Wilk et al; J O S P T'97
  - Wuelker et al; J Biomech '95

Closed Kinetic Chain Exercises

Plyometric Exercises - Double Arm
- Progression to plyos
  - Full/Pain-Free ROM
  - Asymptomatic w. TEx
  - Appropriate strength
- Double-Arm Exercises
  - Chest Pass
  - Overhead Toss
  - Side-to-side (close and away from body)
Plyometric Exercises - Single Arm

Returning to Throw
- Full, non-painful ROM
- Appropriate muscle strength
- Asymptomatic with upper body plyometrics
- Improvement in kinetic chain impairments found during exam

Implementation of Throwing Progression
- Gradual throwing progression for return to full activity
  - Incorporate appropriate rest
  - Modify progression based on subjective reporting and objective measures
  - Modify arm care program to account for increased activity
  - Identify/assess setbacks in throwing program
Points of Discussion at Discharge

- Importance of individualized maintenance program
- Stretching/mobility work
- Arm care program
- Lower extremity/CORE
- Pre/Post Pitching Routine
- Download period following season(s)
- Appropriate volume of activity

Youth Baseball Recommendations

- Limit pitch count and monitor fatigue/mechanics
- Play multiple sports!
- Avoid pitcher/catcher combo
- Encourage down-time from throwing
- EDUCATE PARENTS AND COACHES!!!

Summary

- Perform thorough assessment
- Develop comprehensive TEx program focused on more than grip and forearm strengthening
- Implement manual therapy
- Re-Assess to determine appropriateness to progress
THANK YOU!