Shoulder and Elbow Injuries In Sports

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Introduction

- Overhead throwing
- Rotator cuff injuries
- AC joint problems
- Elbow pain
Overhead Motion Pain

- Quarterbacks
- Tennis Players
- Gymnasts
- Swimmers
- Baseball Players
  - Particularly (or exclusively) pitchers
Protective Guidelines

- Grade school & middle school pitchers
- 3-5 innings per game
- 6-10 innings per week
- Ice, compression after throwing
- Fastball, change-up, slider

NO CURVE BALLS UNTIL HIGH SCHOOL
The Five Phases of Throwing

Wind-up   Cocking   Acceleration   Deceleration   Follow-through

Wind-up: LE strengthening & balance training (core) are key

Cocking: when painful, beware of internal impingement
- **Acceleration:** produces maximum elbow valgus stress
- **Deceleration:** Maximum RTC stress
- **Follow-through:** practice, practice, practice!
PT is an excellent mechanism for throwing evaluation & treatment

- Eval core, UE, and LE mechanics
- Apply corrections
- Intervention modalities
- Use of “return to throwing” protocols
Windmill Biomechanics

- Not as well understood
  - Compared to baseball, foot contact is less stressful
  - Elbow and shoulder stresses appear to approach that of baseball pitchers
Windmill Biomechanics

- Pitching from ground level as opposed to an elevated mound
  - Typically with lower body weight and without additional gravitational force
- Generating greater truncal torque
  - Although shoulder labrum appears more at risk
- Examples of pitching in youth sports are highly contrasted
  - Baseball pitchers will throw around 100-150 pitches in any 3 day stretch
  - Softball is closer to 1200-1500
Rotator Cuff Injuries

Rotator cuff muscles: SITS

- Subscapularis: internal rotator
- Infraspinatus: external rotator
- Teres minor: external rotator
- Supraspinatus: humeral head depressor

Understanding these muscles and their function helps us to interpret the patient history.
Rotator Cuff Injuries

- **Impingement syndrome:**
  - External pressure applied to the rotator cuff tendon (supraspinatus) with the arm forward flexed or abducted
  - May not be associated with an injury
  - Pain with overhead motion
  - Sometimes causes pain at night
Clinical History

- May or may not extend to the elbow
- Pain worsens with use (especially overhead)
- Beware:
  - Weakness
  - A dislocation in patients over age 55
  - Night pain
Special Tests

- Impingement Sign
- Impingement Test
- Speed’s Test
- O’Brien’s Test
- Apprehension Sign
Speed’s Test

- Stand
- Pain with resisted flexion in supination
  - Indicates irritation of the long head of biceps
Impingement Tests

- Standing tests
- Impingement sign or Hawkin’s sign
  Pain with flexion, internal rotation and adduction
- Impingement test
  Pain is relieved via subacromial injection of local anesthetic
O’Brien’s Test

➢ Stand

➢ Pain with resisted flexion & internal rotation

➢ Also, must see an associated correlation of relief of pain with resisted flexion & supination

  • Indicates a possible SLAP lesion, with orthopaedic evaluation likely
Apprehension Sign

- **Supine**
- **Pain with abduction, external rotation and anterior translation**
- **Others:**
  - Relief of pain with abduction, external rotation and posterior rotation
  - Sulcus sign: seated inferior translation
Rotator Cuff Radiographs

- **True A/P of the glenohumeral joint**
  - “Grashey view”
  - Especially useful in glenohumeral osteoarthritis

- **Supraspinatus outlet view**
  - Used to check acromial morphology
  - Type III acromion poorer prognosis

- **A/P & Axillary lateral**
  - Best view of the AC joint
  - Axillary lateral check for os acromiale and tuberosities

**FIG. 6.** Acromion morphology as described by Bigliani et al.\textsuperscript{15}: type I flat, type II curved, and type III hooked.
Rotator Cuff Radiographs

Beware “proximal humeral migration” on plain films
Impingement Syndrome

- Non-operative treatment is successful 33-90%

- Responds nicely to PT, subacromial injections
  - Eliminate any subtle stiffness, modalities
  - Parascapular and rotator cuff strengthening
  - Home program
  - Heat application
  - NSAIDs
Treatment Options & Injections

Options & subacromial injection

- Consider 4-6 weeks PT
- Subacromial space, via a posterior injection portal (2cm medial and 2 cm inferior to the palpable corner of the acromion)
- 2-4cc lidocaine, 2-4cc bupivicaine, 40-80mg depomedrol
- May be repeated at 6-12 week intervals
Fast-Track to Orthopaedics

- Weakness as a chief complaint
  - Especially weakness that is not improved via subacromial injection
- Progressive weakness as PT continues
- Shoulder dislocations in patients over age 55
- Type III acromion
- Presence of os acromiale
Internal Impingement

- A posterior pinching of the rotator cuff on the rim of the glenoid
- Produced by the extremes of extension & external rotation, as in OH athletic motions
Internal Impingement

- By definition, the athlete has lost internal rotation (compared to opposite arm)
- Generally as a product of excessive external rotation
- Sleeper stretch
- Surgery
Shoulder Labral Tears

- Mostly associated with true dislocations
  - In some cases, subluxation alone
  - External rotation in abduction
- Anterior are most common, along with IGHL injuries
- Subscapularis ruptures in severe cases
Shoulder Labral Tears

- Sling and rest
- Use PT for return protocols
- MRI to evaluate recurrent or difficult cases
  - Usually ordered with intra-articular gadolinium, although some 3T magnets are felt to be challenging that!
- SLAP tears
  - O’Brien’s test can be useful, but with low specificity
AC Joint Problems

- Diagnosed via history, bony palpation & radiographs
- Point of shoulder injuries
- AC separations can be ubiquitous in hockey players
AC Joint Biomechanics

- Force is generated with OH movement or with cross-body adduction
- The AC joint couples the axial skeleton to the arm (ie acts as a strut for the wheels)
AC Joint Biomechanics

- Symmetry is not considered crucial
- Athletes search for the quickest return
  - Male & female differences
  - Straps
  - Clothing
  - Cosmesis?
AC Joint Separation
- **Type I:** non-displaced
- **Type II:** minimally displaced
- **Almost always non-operative**
  - Sling or figure-of-eight splint
  - 4-6 weeks in non-smokers
- **Type IV**: superiorly & posteriorly displaced
- **Type V & VI**: crazy displaced
- **Almost always operative**
Type III: superiorly displaced

Felt to represent complete coracoclavicular ligament disruption

- A mix of operative & non-operative
- Orthopaedists argue endlessly about the best approach
- Game-changer hasn’t evolved yet, most surgeries work well
Elbow Pain

- Typically worsened by the valgus overload of OH sports motion
  - Medial traction occurs
  - Along with lateral compression
Lateral Elbow Pain

- Radiocapitellar osteochondroses
  - Panner’s disease (AVN, typically ~8 yrs of age)
  - Capitellar OCD lesions
  - Fractures
  - Growth plate closure is age ~ 13 to 17

- Lateral epicondylitis
  - “Tennis elbow”

- PE is key!
Lateral Elbow Pain

- Most respond to periods of time and relative rest
- Oversized tennis grips
- Emphasize good OH throwing technique
- Injections for lateral epicondylitis
Medial Elbow Pain

- “Little Leaguer’s Elbow” or traction apophysitis
  - Can even be associated with growth plate abnormalities
- MCL injury
  - Was thought to be career ending for a pitcher before “Tommy John” surgery
- Cubital tunnel syndrome
- Flexor pronator strain
Conclusion

- OH motion produces unique forces at the shoulder and elbow
- Understand RTC presentations and exams
- AC joint injury classification
- Elbow pain requires careful exam
Conclusion

- Grade school & middle school pitchers
  - 3-5 innings per game
  - 6-10 innings per week
  - Ice, compression after throwing
  - Fastball, change-up, slider
  - No curve balls until high school!
Thank You