


## Upper extremity injuries in youth athletes

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### Disclosures

- Arthrex: course instructor



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### Little leaguer's shoulder


- Salter harris type 1 physeal injury to proximal humerus
- Seen in adolescent pitchers
- Mechanism
  - Overuse causes repetitive microtrauma at physis
    - From high loads of torque
    - Breaking pitches are implicated
- Pathophysiology
  - Hypertrophic zone is affected
    - Weakest portion of the growth plate



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### Little leaguer's shoulder


- Symptoms
  - Arm and shoulder pain with throwing
    - Worse in late cocking or deceleration phases
    - Pain resolves with rest
  - May be associated with decreased velocity and control
- Physical exam
  - Point tenderness over shoulder physis
  - Pain reproduced with shoulder rotation
  - GIRD common





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### Little leaguer's shoulder

- Imaging
  - Radiographs
    - May be unremarkable
    - Findings include widened proximal humeral physis
    - Metaphyseal bony changes
  - MRI
    - Shows edema around physis
    - Helpful to rule out other pathology (internal impingement, labral tears)



### Little leaguer's shoulder

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Little leaguer's shoulder

- Non-operative
  - Rest, ice, PT, progressive throwing program
  - Majority of patients
  - Refrain from pitching 2-3 months
    - Return only after asymptomatic
  - PT
    - Rotator cuff strengthening
    - Posterior capsule stretches
    - Core strengthening and stretching
  - Progressive throwing program
    - Start with short tosses at low velocity
    - Progress slowly with distance and velocity
- Prevention
  - Correct pitching mechanics
  - Discourage breaking ball pitches until skeletal maturity
  - Enforcement of pitch counts

Little leaguer's shoulder

Pitch Count Recommendations		
Age (years of age)	Pitches per Game	Max Games per Week
8-10 yrs.	52	2
11-12 yrs.	68	2
13-14 yrs.	76	2
15-16 yrs.	91	2
17-18 yrs.	106	2

Little leaguer's shoulder

- Complications
  - Premature growth arrest
  - Length or angular deformity

Little leaguer's elbow

- Generic term for medial elbow injury
  - Medial epicondyle stress fractures
  - Ulnar collateral ligament (UCL) injuries
  - Flexor-pronator mass strains
- Epidemiology
  - Younger patients are more likely to have apophysitis or avulsion injuries, rather than UCL sprains
  - Weak link in the chain
- Risk factors
  - Overload leads to repetitive microtrauma
    - Greater than 80 pitches per game
    - More than 8 months of competitive pitching per year
    - Fastball speed >85mph
    - Continued pitching despite arm fatigue/pain
    - Participating in showcases

Little leaguer's elbow

- Symptoms
  - Elbow pain in throwing arm
  - Decreased throwing speed, accuracy, and distance
- Physical exam
  - Tenderness to palpation about medial elbow
  - Pain with valgus stress
  - Instability with valgus stress notes more severe involvement
- Imaging
  - XR: AP/Lat/ER oblique
    - May show physal widening, fragmentation or avulsion
    - Get contralateral film
  - MRI
    - Will show increased edema, UCL injury

Little leaguer's elbow

- Nonoperative
  - Rest, activity modifications, PT
    - Coach and parent education is critical to limit number of innings pitched per week
    - Use minimal immobilization
- Operative
  - Operative fixation of medial epicondyle
  - UCL reconstruction
    - Similar to adult treatment
- Complications
  - Ulnar nerve neuropathy
  - Continued pain and instability
  - Loss of motion
  - Inability to return to same level of play

Multidirectional instability (MDI)

- Also referred to as AMBRI
  - Atraumatic Multidirectional Bilateral Rehab Inferior capsular shift
- Incidence peaks in the second and third decades of life
- Pathophysiology
  - Microtrauma from overuse
    - Seen with overhead throwing athletes, volleyball players, swimmers, gymnasts
  - Generalized ligamentous laxity
    - Ie Ehlers Danlos and Marfan's
- Pathoanatomy
  - Patulous inferior capsule (IGHL anterior and posterior bands)
  - Rotator interval deficiency
  - Can have glenoid or labral lesions as well from traumatic events
    - Ie Bankart, bone loss, Kim lesion

Multidirectional Instability (MDI)

- Glenohumeral stability
  - Static restraints
    - Glenohumeral ligaments
    - Glenoid labrum
    - Articular congruity/version
    - Negative intraarticular pressure
  - Dynamic restraints
    - Rotator cuff muscles
    - Biceps
    - Periscapular muscles

Multidirectional instability (MDI)

- Symptoms include pain, weakness, paresthasias, crepitus
  - Instability
  - Instability during sleep
- Physical exam:
  - Sulcus sign
  - Apprehension/relocation test
  - Load and shift test (posterior instability)
  - Neer and Hawkins tests
    - In patients <20 years old this signals possible MDI
  - Generalized ligamentous laxity (**Beighton Score**)
    - Able to touch palms to floor while bending at waist
    - Genu recurvatum
    - Elbow hyperextension
    - MCL hyperextension
    - Thumb abduction to the ipsilateral forearm
- Rule out unidirectional instability, cervical spine disease, brachial plexitis, TOS



Multidirectional instability (MDI)

- Imaging
  - Radiographs
    - 3V shoulder
  - MRI
    - Indications (always)
    - Findings include:
      - patulous inferior capsule
      - Bankart lesion
      - Kim lesion
      - Bony erosion of glenoid
  - Arthroscopy
    - Drive through sign

Multidirectional Instability (MDI)

- Nonoperative treatment
  - Physical therapy
    - First, second, third line
    - 3-6 months
    - Strengthen rotator cuff, periscapular stabilizers
    - Closed chain exercises
- Operative treatment
  - Capsular shift/stabilization
    - After failing extensive nonoperative treatment
    - Pain and instability that interferes with ADLs or sports
    - Beware of voluntary dislocators

Multidirectional Instability (MDI)

- Techniques
  - Open or arthroscopic
    - Inferior capsular shift
    - Plication of redundant capsule
    - Rotator interval closure
    - Address labral pathology/bone deficiency
  - Post-op rehab
    - 4-6 weeks shoulder immobilizer (come to salute position)
    - 6-10 weeks- 45/45
    - 10-16 weeks- 90/90
    - Strengthening
    - Contact sports at 9+ months (if normal strength and motion)

## Multidirectional instability (MDI)

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- Complications
  - Subscapularis injury (open approach)
  - Loss of motion !!!
  - Axillary nerve injury
  - Recurrence