

Evaluation and Treatment of Common Pediatric Sports Medicine Injuries

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Disclosures

- None

Outline

- Background
- Acute Injuries
- Overuse Injuries
- Injuries specific to the throwing athlete
- When to refer

Background

- Both acute and overuse injuries are extremely common given the high prevalence of sports participation in youth population
- Estimated >60 million children age 6-18 participate in organized sports
- Increasing levels of competition at an earlier age may be a factor increasing the prevalence
- Nearly half of all injuries are due to overuse

Acute Injuries

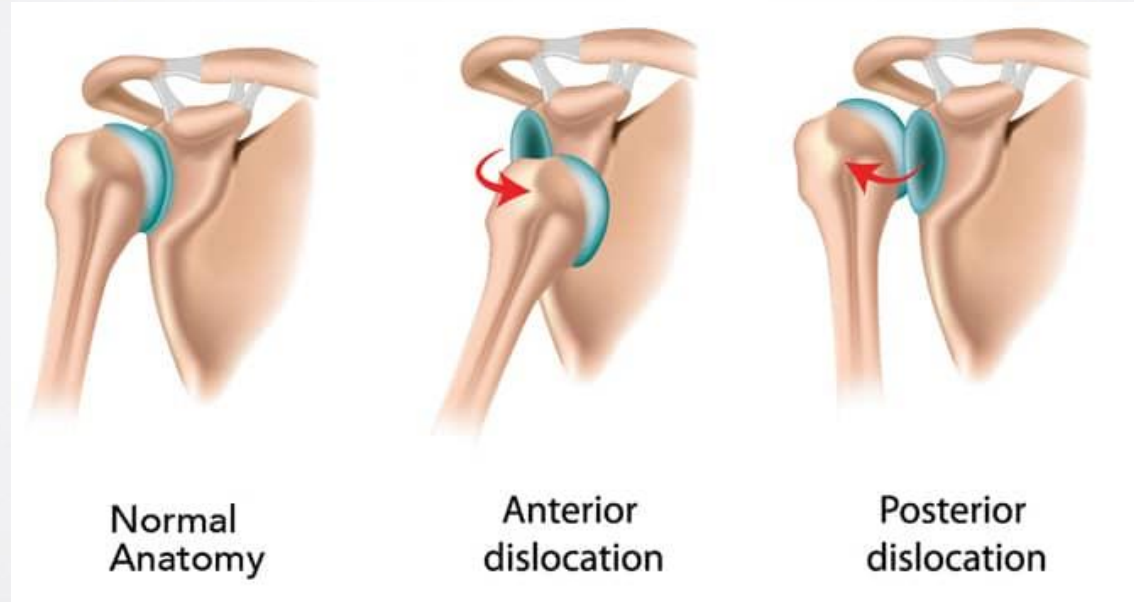


Fractures and Joint Dislocations – General Principles

- Presenting signs
 - Pain
 - Point tenderness
 - Swelling or ecchymosis
 - Deformity
- Assess neurovascular status
- Reduce and immobilize
- Open fractures
 - Direct immediately to ER

Glenohumeral dislocation

- Mechanism is typically abduction external rotation force
- Most commonly anterior inferior dislocation
- Symptoms
 - Pain
 - Restricted motion
 - Paresthesias
- Diagnosis
 - Physical Exam
 - XRs
- Treatment
 - Prompt reduction
 - Immobilization
 - Advanced imaging
 - Surgery versus rehab



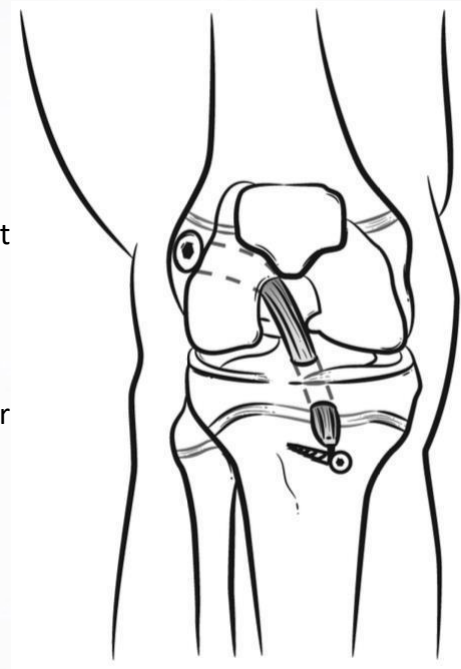
ACL Tear

- Usually twisting, non-contact injury
- Up to 7 times more common in females
- Common in soccer, basketball, skiing, football
- Presentation
 - Often feel “pop”
 - Immediate swelling (hemarthrosis)
 - Generalized knee pain
 - Instability in chronic cases
- Examination
 - Lachman, Anterior Drawer, Pivot Shift
 - Assess for concurrent injuries
- Treatment
 - Acute management with KI or HKB



Surgical Reconstruction

- Indicated in nearly all instances of acute tears
 - Prevention of instability and progression of arthritis
- Technique depends on surgeon preference and skeletal maturity of patient
- Skeletally Immature population
 - Transphyseal
 - Risks: Physeal closure, growth arrest, valgus or recurvatum deform
 - Physeal sparing reconstruction
 - Non-anatomic
- Rehabilitation
 - Focuses on exercises that to do no excessively stress graft
 - Emphasis on closed chain exercises
- Return to play
 - No widely accepted criteria
 - Previously held consensus is 9 months post-injury

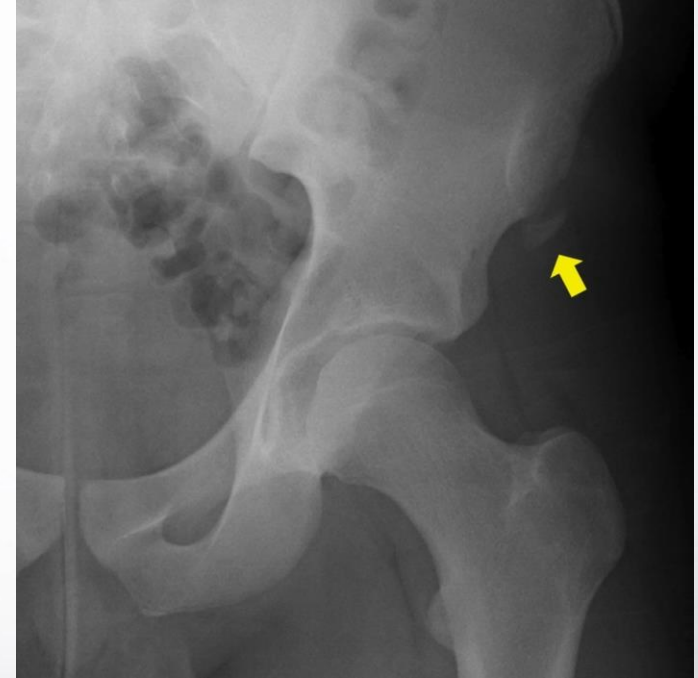


Salter-Harris I Fractures of Distal Fibula

- Often difficult to distinguish from ankle sprain
- Occurs to incomplete physeal closure
- Presentation
 - Inversion injury
 - Lateral ankle swelling
 - Pain with WB
 - Tenderness over distal fibula physis
- Often radiographically occult
- Treatment
 - Walking boot and WBAT
 - Repeat exam 3-4 weeks post injury

Hip Avulsion Fractures

- Occurs due to sudden forceful contraction of muscle
 - Kicking, sprinting, jumping
- Most common locations
 - ASIS: Sartorius
 - AIIS: Rectus femoris
 - Ischial tuberosity: hamstring
- Presentation
 - May present with soft tissue swelling and ecchymosis
 - Antalgic gait
- Acute management
 - XRs to assess for degree displacement
 - Typically treated conservatively
 - Rest from sport, crutches, RICE, NSAIDs



Stingers

- Occurs due to sudden traction on cervical nerve roots or brachial plexus usually during contact sports
 - C5-C6 most common nerve root involved
- Presentation
 - Sudden onset of burning, paresthesia, weakness
 - Resolves spontaneously after several minutes
- Important to rule out cervical spine injury
 - Presence of bilateral symptoms
 - Neck pain
 - Safe to return to play following resolution
 - No pain, numbness, weakness, full neck AROM

Overuse Injuries

- Physiolyysis Syndromes
 - Excessive forces across growth place
- Apophysitis
- Epiphyseal Injuries
 - Osteochondritis Dissecans
- Stress Fractures

Distal Radius Stress Syndrome

- Commonly seen in gymnasts, tumblers, and cheerleaders
- Occurs secondary to excessive axial loading of the wrist or traction forces (bars)
- Presentation
 - Pain, particularly with wrist extension
 - Tenderness over distal radial physis
 - May see widening or sclerosis of physis on XR
- Treatment
 - Rest and activity modification for 8-12 weeks
 - PT with emphasis on forearm, shoulder, and core strengthening

Osgood-Schlatter

- Traction apophysitis of the tibial tubercle
- Demographics
 - More common in males
 - Female: 8-12 years, Male: 12-15 years
 - Bilateral in 20-30%
 - More prevalent in jumping sports
- Presentation
 - Pain located over anterior knee
 - Exacerbated by kneeling or jumping
 - Tenderness +/- prominence over tibial tubercle
- XRs can confirm but not essential for diagnosis
- Treatment
 - NSAIDs, activity modification, RICE, patellar strap
 - 90% have complete resolution
 - Typically resolves as skeletal maturity progresses



Sinding-Larsen-Johansson Syndrome

- Similar pathogenesis to OS
- Occurs at patellar tendon insertion at inferior pole of patella
 - XR may show spur, fragmentation
- Similar treatment to OS
 - Self-limiting
 - Neither disease typically warrants operative treatment

Sever's Disease

- Traction apophysitis of calcaneus
- Presents with posterior heel pain
- Similar patient population to SLJ and OS
- Advanced imaging not indicated unless fail to improve with conservative treatment
- Treatment
 - Symptomatic
 - Activity modification, Achilles tendon stretches, RICE, NSAIDs, SLC
 - Recurrence is common
 - No role for operative treatment

Osteochondritis Dissecans

- Pathologic lesion of articular cartilage and subchondral bone with variable clinical patterns
- Epidemiology
 - Age 10-15 prior to physeal closure
 - Knee most common location, specifically MFC (70%)
 - Other locations include capitellum of humerus and talus
- Pathophysiology
 - Softening of overlying cartilage with intact articular surface
 - Separation of articular cartilage from subchondral bone
 - Detachment of lesion → loose body
- Presentation
 - Insidious, poorly localized pain
 - Recurrent effusions
 - Mechanical symptoms

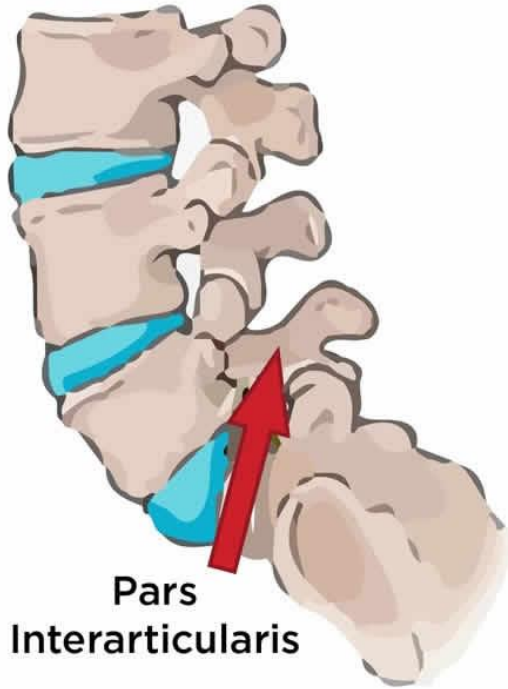
- Imaging
 - Often apparent on XR depending on stage, size of lesion
 - If high suspicion for OCD, refer for MRI
- Management
 - Non-operative
 - Stable lesions in children with open physis
 - 50-75% healing rate
 - Operative
 - Diagnostic arthroscopy
 - Subchondral drilling
 - Fixation of lesion
 - Chondral resurfacing



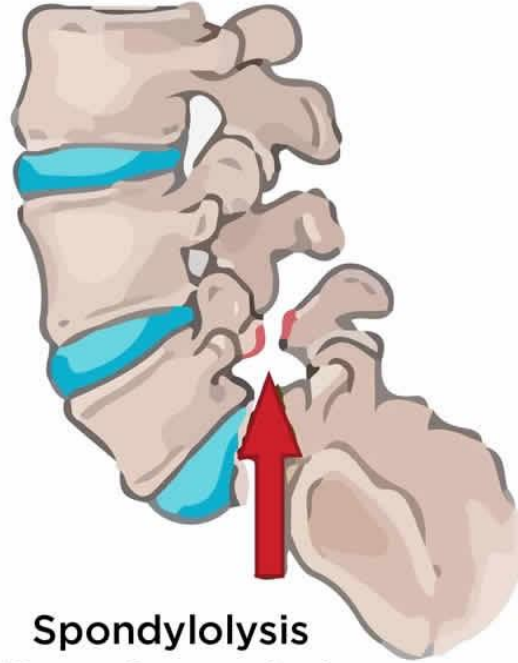


Spondylolysis and Spondylolisthesis

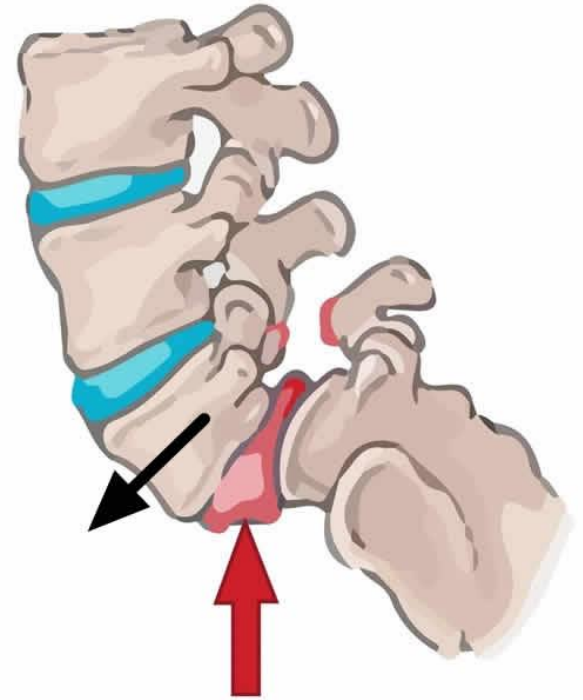
- Fracture (often stress-related) of the pars interarticularis which may progress to malalignment of adjacent vertebral bodies
- Most commonly occurs at L5 with anterior translation of L5 on S1
- Incidence
 - Up to 7% of adolescent athletes
 - Implicated in 50% of LBP in this population
 - Especially prevalent in gymnasts, weightlifters, football linemen and linebackers
 - Contact sports involving hyperextension
- Begins as stress reaction without bone disruption and may progress to fracture
- Classic presentation of healthy active adolescent who presents with LBP with athletic activity



**Pars
Interarticularis**



Spondylolysis
(*Stress fracture in the
Pars Interarticularis*)



Spondylolisthesis
(*Stress fracture and
sliding of vertebra*)

- Presentation
 - Insidious onset of LBP with activity
 - Hamstring tightness (most common)
 - Knee contractures
 - Radicular pain (L5 nerve root)
- Physical Exam
 - Neurologic exam
 - Popliteal angle
 - Provocative testing with lumbar extension
- Imaging
 - Plain radiographs
 - CT scan
 - MRI

- Treatment

- Observation

- Asymptomatic patients

- Physical therapy and activity modification

- Focus on hamstring stretching, exercises to improve pelvis tilt
 - Core strengthening
 - Most patients improve with conservative treatment

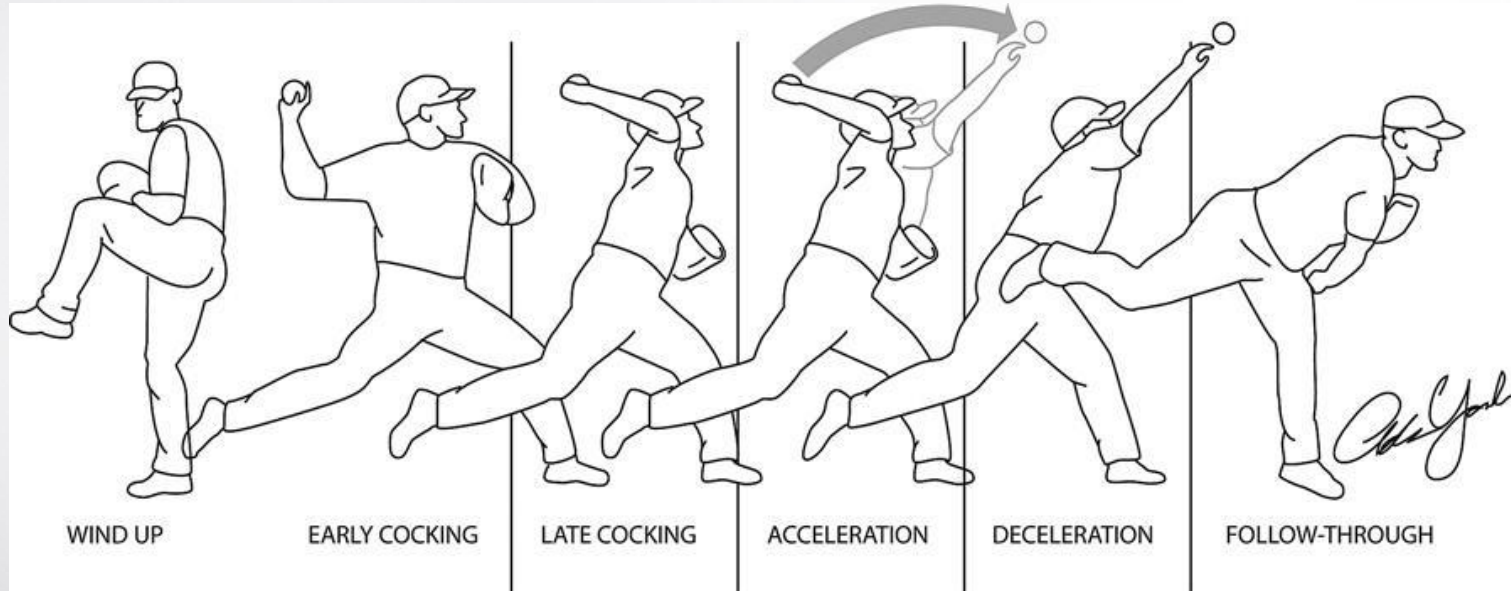
- TLSO Bracing

- Acute stress reaction
 - Failure to improve with PT

- Operative

- Majority do not require operative intervention
 - Often involves fusion of involved segment +/- reduction if spondylolisthesis

Injuries in the Throwing Athlete



Little Leaguer's Shoulder

- Epiphysiolysis of the proximal humerus
- Males>females
- Repetitive torsional and distraction forces across physis (SH1)
- Phases of throwing
 - Late cocking
 - Deceleration
- **Number of pitches**
- **Type of pitches thrown**



- Presentation
 - Decrease in velocity and accuracy
 - Insidious shoulder pain
 - Relieved with rest
- PE
 - Tenderness to proximal humerus
 - GIRD
 - Reproducible pain with throwing motion
- XRs
 - Widened proximal humeral physis
 - MRI not indicated unless other pathology suspected

- Treatment
 - Non-operative
 - Cessation from throwing (>3 months)
 - PT
 - RC strengthening
 - Capsular stretching
 - Core and lower body
 - Progressive throwing program
- Prevention
 - Proper pitching mechanics
 - Use of coaches
 - Limited use of breaking ball
 - Pitch counts and rest days
 - Avoidance of year-round activity

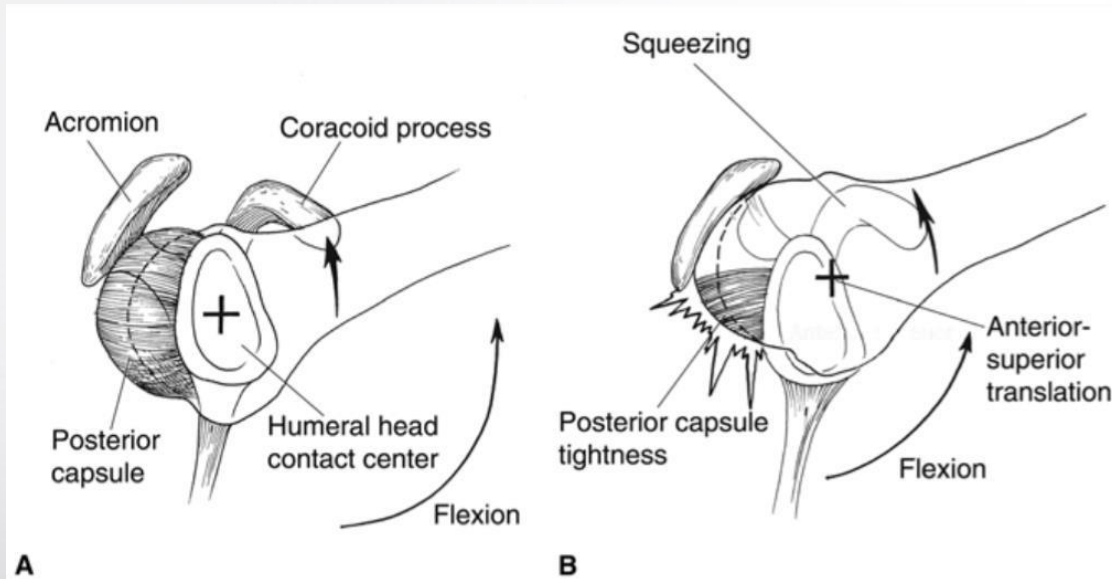


GIRD (glenohumeral internal rotation deficit)

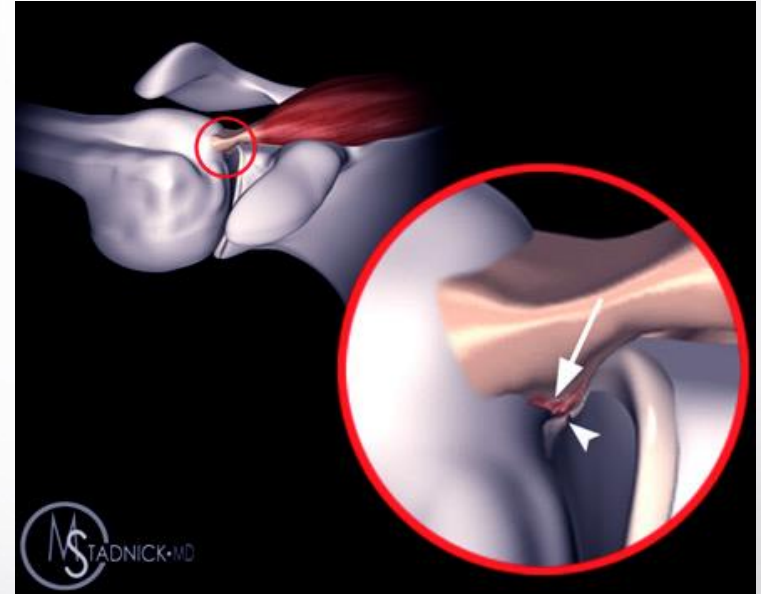
- Anatomical adaptation
- Clinical diagnosis compared to contralateral side
 - Decrease in internal rotation
 - Increase in external rotation
 - Decreased total arc of motion
- Classically seen in baseball pitchers
- Presentation
 - Vague shoulder pain
 - Often asymptomatic

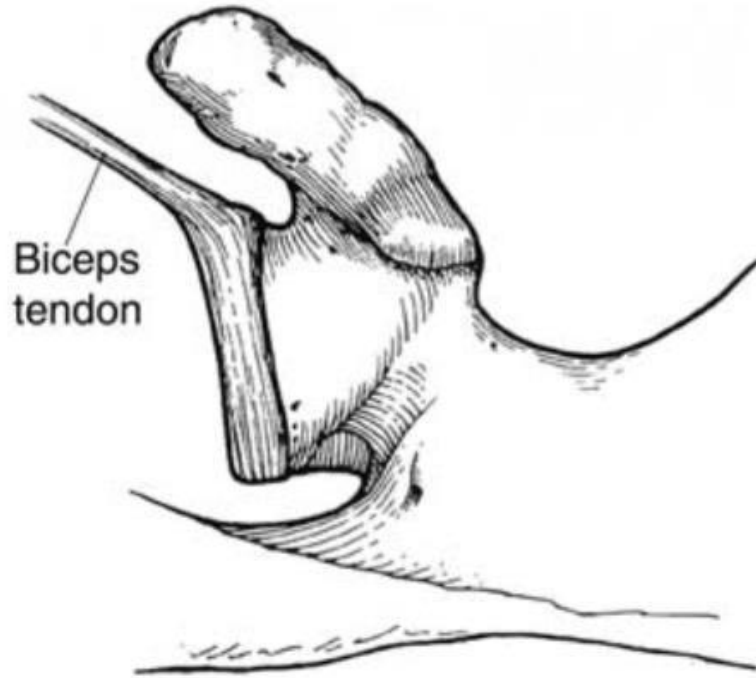


- Pathophysiology
 - Tightening of posterior capsule leads to translation of humeral head in OPPOSITE direction
 - Anterior superior in flexion, Posterosuperior in ABER

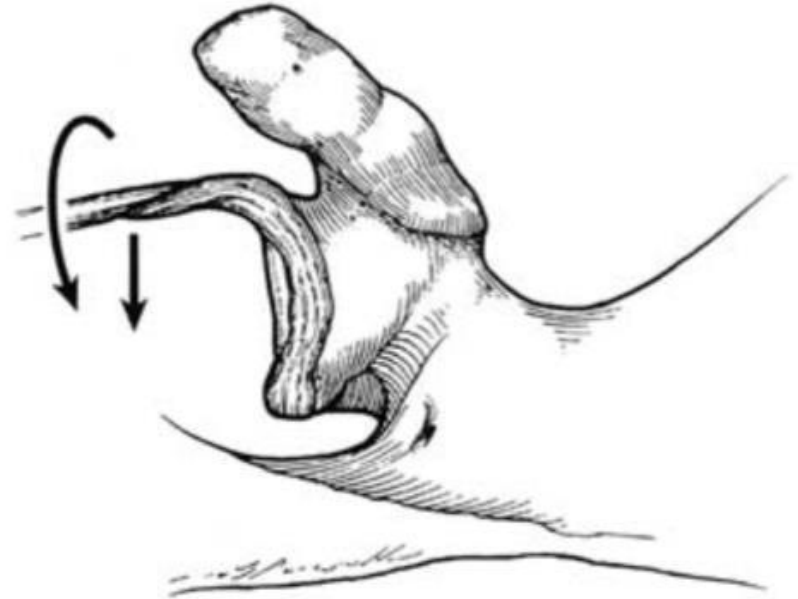


- Associated conditions
 - Internal Impingement
 - Abutment of GT against posterior superior glenoid during ABER causing impingement of RC
 - Distinct from external impinge
 - Partial RCT
 - Excessive rotation
 - SLAP lesion
 - 25% risk in throwers with GIRD
 - Peel-back mechanism
 - O'Brien's Test





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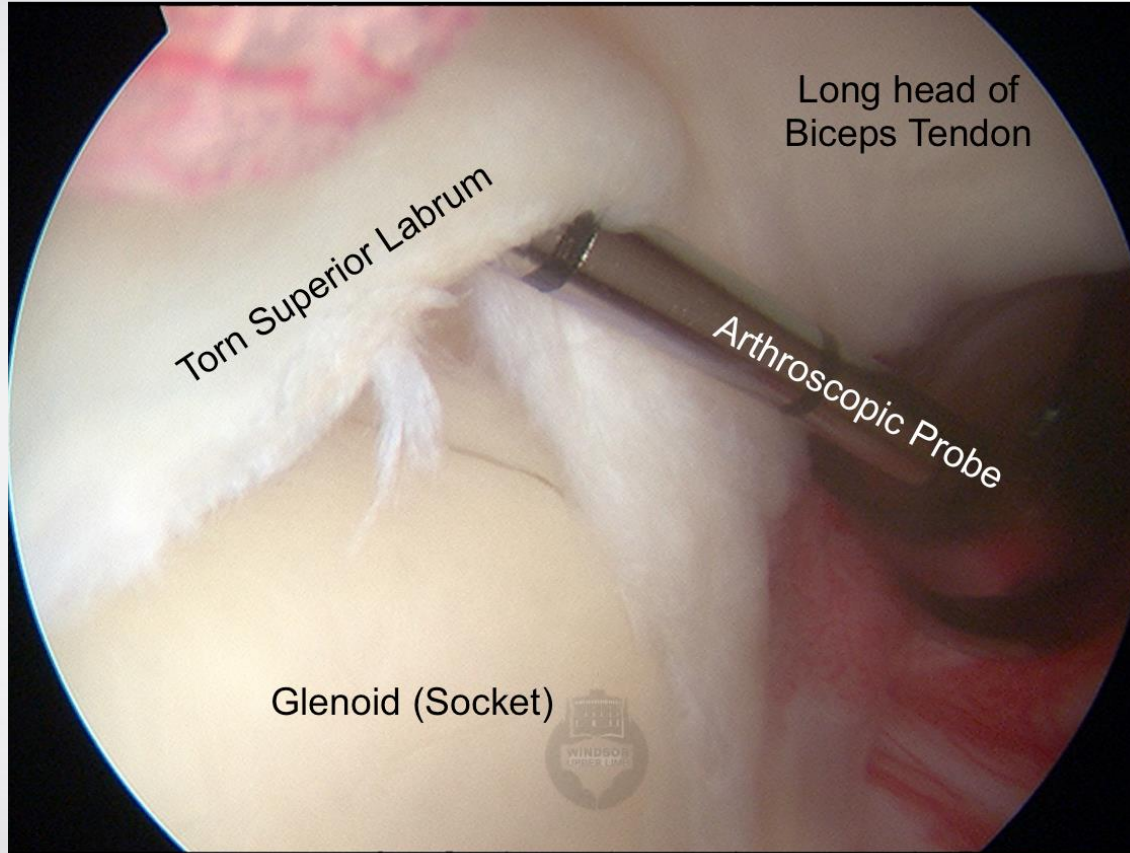
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Treatment

- Rest from throwing (>6 mo) and PT
 - First line of treatment
 - Sleeper stretch
 - Pec minor stretching
 - RC and periscapular strengthening
- Outcomes
 - Greater than 90% respond to nonoperative modalities

Operative Treatment

- Indicated after extensive failure of PT
- Posterior capsular release
- Anterior capsular imbrication
 - Controversial (chicken versus the egg)
- Rotator cuff debridement versus repair
- Biceps tenodesis
- SLAP repair



Throwing Disorders of the Elbow

- Spectrum of disorders
 - Little League Elbow
 - Valgus Extension Overload
 - UCL injury
 - Flexor/pronator mass strain
 - Olecranon stress fracture
 - Ulnar neuritis
 - OCD lesion of capitellum





Little League Elbow

- Clinical diagnosis made with tenderness over medial elbow worse with valgus stress
- Younger throwers more likely to have apophysitis or avulsion injuries versus UCL pathology
- Tension overload of medial structures due to repetitive valgus loading
 - Microtrauma to immature elbow
- Risk factors
 - Rule of 8's
 - >80 pitches per game
 - >85 mph
 - Continued pitching despite pain
 - >8 months pitching per year

- Symptoms
 - Decreased velocity, accuracy, and distance
 - Vague elbow pain
- Imaging
 - XRs may show physeal widening, fragmentation of ME, OCD
 - MRI indicated if failed to improve with nonoperative modalities
 - May confirm UCL insufficiency, stress fracture, OCD
- Physical Exam
 - Try to pinpoint tenderness, may be difficult
 - Provocative testing
 - Milking maneuver
 - Moving valgus stress test



Nonoperative Treatment

- Rest and Physical Therapy
 - First line of treatment for most injuries
 - Focus on Flexor/Pronator strengthening
 - Education on pitching mechanics and technique
 - Pitching coach
 - Progressive return to throwing program

Operative Treatment

- UCL reconstruction versus repair
 - Internal brace augmentation
 - Allograft versus autograft
- Arthroscopic resection of osteophytes
 - May also include loose body removal, chondral debridement
- Cubital tunnel release +/- ulnar nerve transposition



Questions?

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