Children's National and the Pediatric Health Network

Overuse Syndromes and Injury Prevention

2023-08-09

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Introduction and Welcome

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Notes About Today's Town Hall:

- All lines are muted throughout the presentation.
- Please use the Q&A to ask questions or make comments.
- We will be recording the session.
- Today's recordings and materials will be posted to the Children's National website and the Pediatric Health Network website following the presentation.
  --ChildrensNational.org
  --PediatricHealthNetwork.org

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Overuse Syndromes and Injury Prevention

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Disclosures

None

Objectives

1. Understand common overuse and sports injuries.
2. Learn about treatments for overuse and sports injuries.
3. Learn about resources for injury prevention and higher acuity care for recalcitrant overuse and sports injuries in adolescents

The Fight for Children Sports Medicine Center at Children's National Hospital

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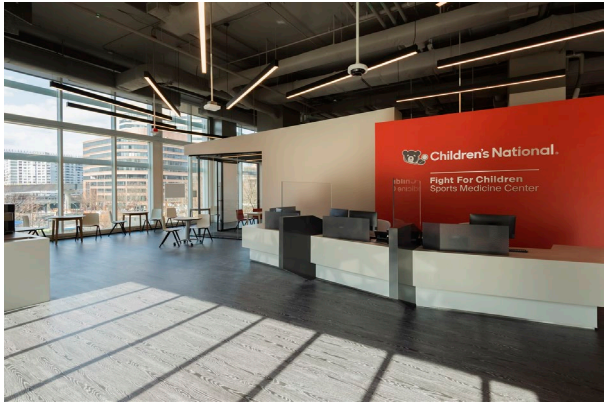
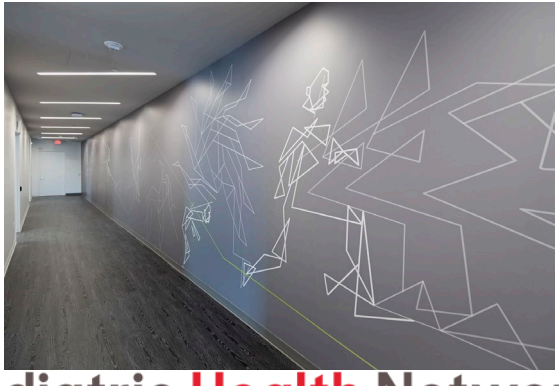
https://www.youtube.com/watch?v=o381jTOjr58

The Sports Medicine Center





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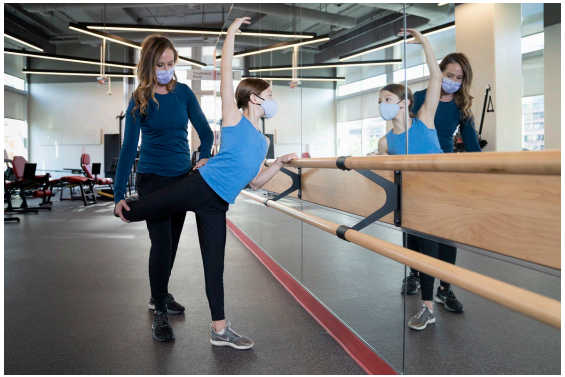
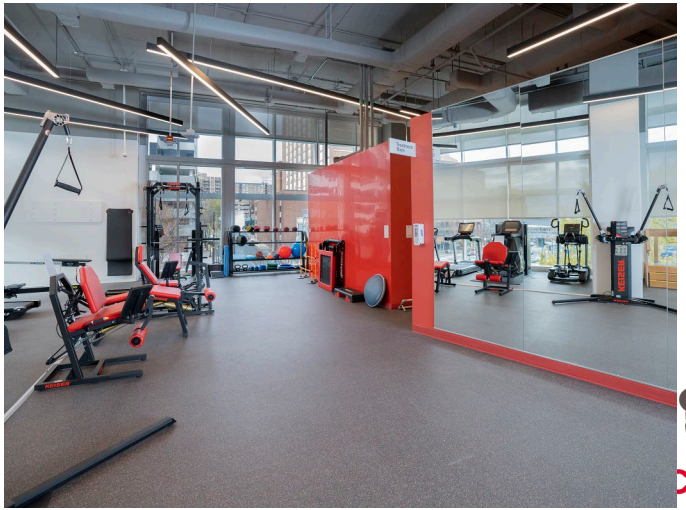
Sports Physical Therapy





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Who to Refer

- Athletes of all ages
- Any acute injury
- Any subacute-to-chronic injury
- Persistent pain or limitations with activity
- Need for DME, X-ray, etc.
- Guiding return to play
- Advanced imaging ordering and interpretation

Why Choose the Sports Medicine Center

- Experts in sports medicine and orthopaedics
- Modern, evidence-backed treatment
- In-office procedures and diagnostic ultrasound
- Fast access
- Communication with PCPs and care team members
- Accept all insurances
- All-in-one care

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How to Refer

- Patient/families call 301-576-2000
- New patient visits: Availability within 1 week
- For acute concerns, PCPs / referring providers can contact Dr. Desai for assistance
- Conditions we see:
  - Surgical and non-surgical ortho/msk complaints
  - Sports-related concussions
  - Stress fractures / Female athlete triad / REDS
  - Many others – if unsure, always happy to field questions

Contact Info

- Keyur Desai, MD, CAQSM
- (o): 301-576-2000
- (f): 301-576-2020
- (e): KDesai2@childrensnational.org
  - Referral follow-up
  - Acute referrals
  - Other questions

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BACKGROUND

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Observations About Sports Injuries

- Increasing rates of youth sports specialization
- Increasing volume of total sports participation
- Advanced maneuvers in untrained athletes
- Lack of adequate strength and recovery

CASES

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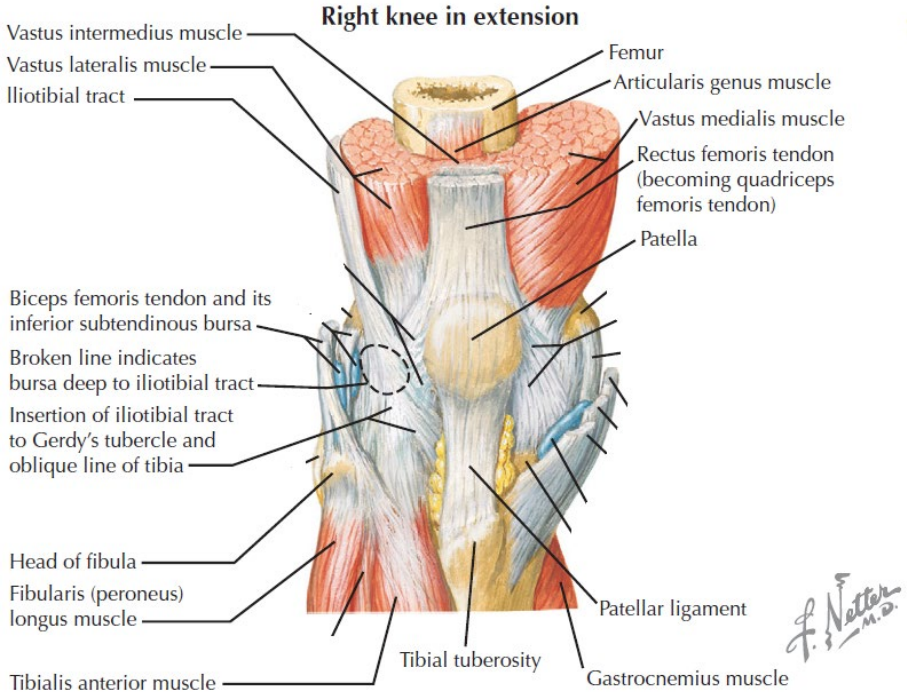
Case 1

What is the diagnosis in each of these cases?

- A 12-year-old male basketball player has pain at his anteroinferior knee. Your exam localizes tenderness to the distal patellar pole.
- An 11-year-old female runner reports anteroinferior knee pain and localized swelling. On exam, you localize it to the tibial tubercle.
- A 17-year-old skeletally mature high school senior that just signed a D1 scholarship offer has pain with running and jumping activities inferior to the patella.

The Extensor Mechanism of the Knee



Extensor Mechanism Injuries

- Mechanism: Running and jumping → Repetitive knee flexion and extension → Increase energy in the extensor mechanism
- Common exam findings:
  - Pain with heel walking, single-leg squats, hops, resisted knee extension, passive knee flexion, resisted straight leg raise
  - Weakness with hip flexion, hip abduction

Physical Exam Maneuvers

Extensor Pathology: Conditions

	Sinding-Larsen-Johansson Syndrome	Osgood-Schlatter Disease	Patellar Tendinopathy
Pathophysiology	Non-articular osteochondrosis	Non-articular osteochondrosis	Tendon degeneration due to impaired healing
Common Age Range	11-13yo	Female: 10-13yo Male: 12-14yo	14-16yo
Possible Specific PE Findings	TTP: Inferior patellar pole STS: Inferior patellar pole	TTP: Tibial tubercle STS: Tibial tubercle	TTP: Proximal or mid-substance patellar tendon

Extensor Pathology: Imaging

Extensor Mechanism Pathology: Treatments

- Physical therapy:
  - Hamstring flexibility
  - Hip and core strength and stability
  - Quadriceps strength
    - Eccentric patellar tendon loading for Patellar Tendinopathy
  - Dynamic control of running, squatting, jumping

Extensor Mechanism Pathology: Treatments

- Local ice massage
- Rx:
  - Topical diclofenac gel 1%
  - NSAIDs
  - Acetaminophen
- Patellar tendon strap

Imaging and PT Info

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Ordering XR Before Referral

- In general, more efficient at their visit
- On-site XR and ultrasound as necessary
- Trained orthopedics radiology tech
- Exception: Fracture concerns
- In general, MRIs best ordered by sports/ortho

XR Views

- Specify in your order – facility defaults are variable
- Knee: 4v – AP, Lateral, Sunrise/Merchant, Tunnel
- Shoulder: 4v – AP, Grashey, Scap-Y, Axillary
- Hip: 3v – AP, Frog, and Dunn Lateral of pelvis
- Elbow: 3v – AP, Lateral, Oblique
- Ankle: 3v – AP, Lateral, Mortise

Ordering PT

- Provide diagnosis
- "Eval and treat"
- No. of visits and week
- Phases of rehab, restrictions, modalities
- Muscle groups of focus and special instructions
- Goals of therapy
- Pertinent findings on PE

Diagnosis:

____ Patellofemoral Pain Syndrome
____ Sinding-Larsen-Johannson Syndrome
____ Osgood-Schlatter Disease
____ Patellar Tendinitis

□ Trial KT Tape for patellar tracking

□ Evaluate patellar tendon strap use (should be over patellar tendon not T tubercle or Patella)

Treatment Plan: Evaluate and treat, 1-2x/wk for 8 weeks. Provide HEP and update regularly as appropriate.

Phase I: Management of Acute Pain, Limited ROM, Swelling/Effusion.
Use of modalities to reduce swelling and pain (e.g. GameReady, stim, manual therapy)
Active and passive knee ROM techniques. If limited, include heel slides in HEP, 2-3x daily 3x10 reps.
Quad isometrics. Estim to VMO if unable to perform. Consider terminal knee extensions.
Gluteus medius strengthening. Double leg bridges. Side-lying hip abduction/straight leg raises.
SLR: Up to 5-10lbs as tolerated.
If quad lag with SLR then estim to VMO and short→long arc quads until lag resolves.
Stretching: ITB, Quad, Hamstring, Gastroc, Heel cord.

CASES

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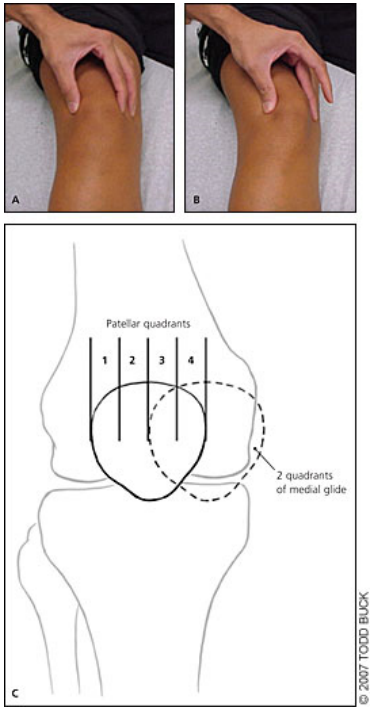
Case 2

- A 15-year-old female runner is being seen for atraumatic anterior knee pain. She reports pain with running, jumping, and prolonged sitting. On exam you note mobile patellae, tenderness to palpation of the patellar facets, positive patellar grind, and dynamic knee valgus on single-leg squats.

Patellofemoral Pain Syndrome

- Atraumatic anterior knee pain:
  - Repetitive flexion/extension activity
  - Prolonged sitting
- PE:
  - TTP patellar facets
  - Increased patellar glide
  - Patellar grind
  - Look for "J" sign



Patellofemoral Pain Syndrome: Treatments

- Physical therapy:
  - Hip and core strength and stability
  - Quadriceps and hamstring strength
  - Dynamic control of running, squatting, jumping
  - Trial of KT taping for patellar stabilization
- Consider patellar stabilizing brace
- NSAIDs, Acetaminophen PRN pain

Anterior Knee Pain: Relationship to Mental Health

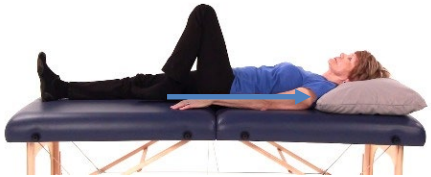
- Suggested link between mental health and PFS:
  - Depression, Anxiety
  - Kinesiophobia: Fear of movement
- Consider mental health eval (PHQ9, GAD7) for recalcitrant symptoms

Anterior Knee Home Exercises

Straight leg raise

Side lying hip abduction

Supine bridge



Heel slide

Quad set

Seated knee extension

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Return to Play Considerations: Anterior Knee Pain

- Pain not a strict contraindication to athletic participation
- Avoid play with:
  - Severe pain
  - Antalgia / abnormal movement during or after activity
  - Pain incompatible with goals
    - High school athlete wanting to play college, with pain in the offseason
- Consider modifications:
  - Biking or elliptical instead of running for conditioning
  - Discontinue knee extension machine
  - Evaluate squat form
  - Reduced minutes

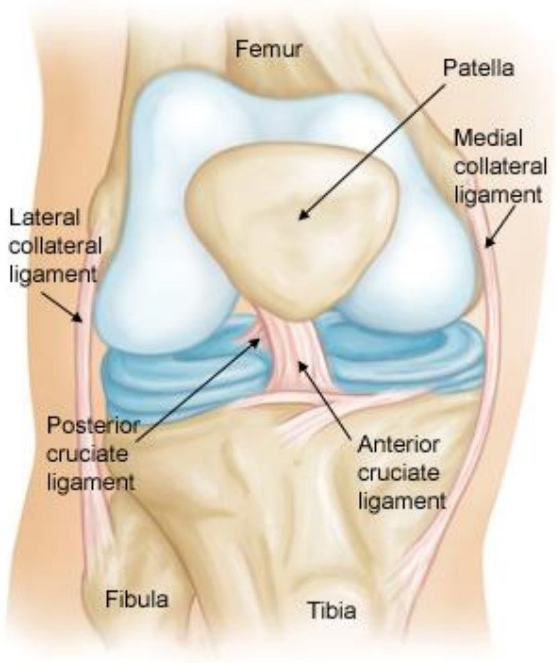
Case 3

- A 16-year-old female basketball player jumped for a lay-up, landed "funny," and felt a pop. She presents to your office the following day. Her knee is visibly swollen and she is having difficulty walking.

ACL Rupture: Epidemiology

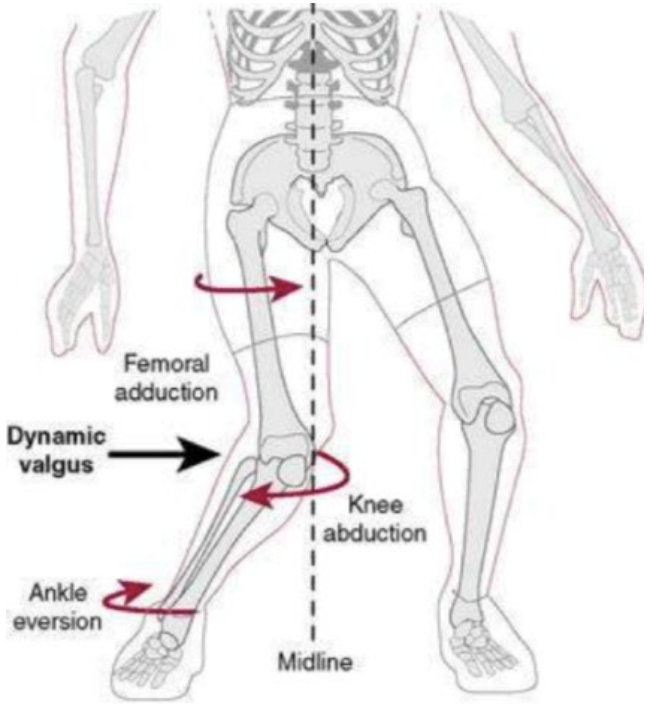
- Approximately 40-200 cases per 100,000 person-years
- Female athletes 2.4-9.7 times higher rate than male athletes in same sport

ACL Rupture: Anatomy



ACL Rupture: Mechanics and Mechanism

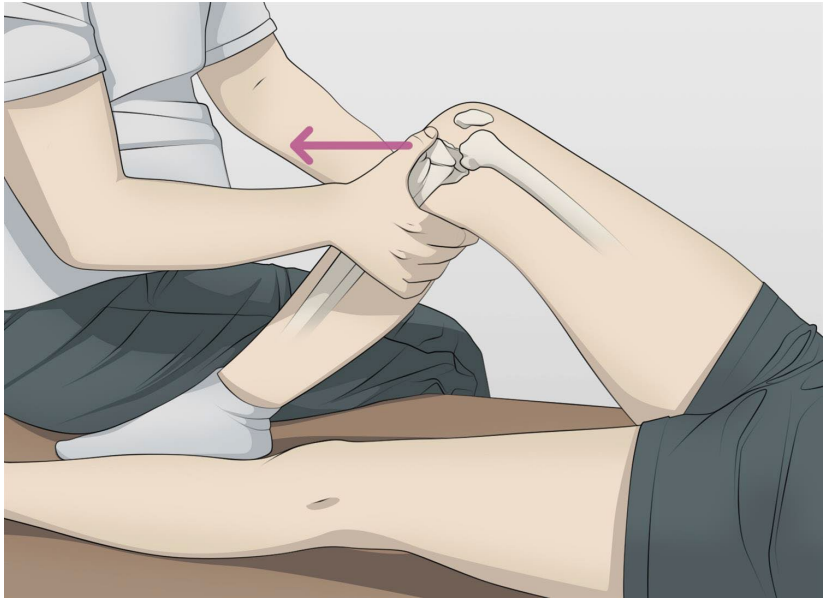
- ACL resists translational force and rotational torque
- Common mechanisms:
  - Vigorous eccentric quad contraction
  - Varus-valgus moments
  - Internal rotation moments
  - Deceleration moments
  - Hyperextension moments
- Position of No Return:
  - Hip adduction and IR
  - ER of the tibia relative to femur
  - IR of tibia on the foot
  - Forefoot pronation



ACL Rupture: Physical Exam (acute)

- Effusion: Intra-articular swelling, differentiable from soft tissue swelling
- Range of motion: Reduced, held in flexion, lost extension
- Positive Lachman, and/or Anterior drawer
- May be unable to weight-bear

ACL Tests



ACL Rupture: Acute Management

- X-rays to rule-out fracture (4V Knee: AP, Lateral, Sunrise/Merchant, Tunnel)
- Crutches: Nonweightbearing
- Bracing optional
  - Restricts motion
- Knee injury prehab: Heel slides, Quad sets, SLR
- Referral to sports medicine

ACL Acute Prehab

Straight leg raise

Heel Slide

Quad set

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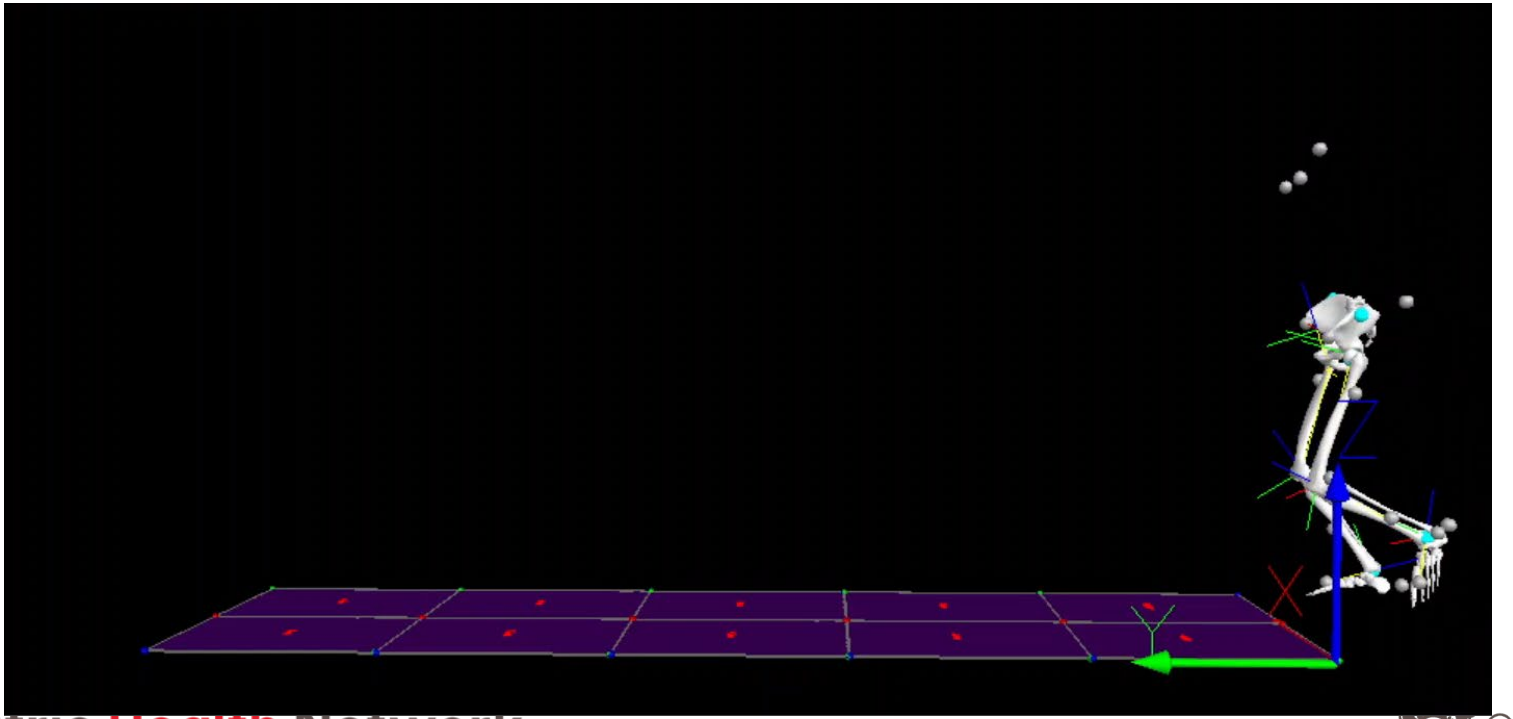
ACL Rupture: Injury Prevention



ACL Rupture: Injury Prevention

- ACL Injury Prevention Evaluation:
- 2D and 3D evidence-based evaluation in a state-of-the-art motion capture lab
- Extensive document with quantitative and qualitative analysis for customized, individual risks for ACL rupture
- Families can call 301-576-2000, option 3 for more information
  - Not covered by insurance

Case 4

- A 12-year-old golfer presents to your office. She is right-hand-dominant. She has been increasing her volume of golf and competing in multiple tournaments. She is now having shoulder pain especially as she tees off or drives the ball.

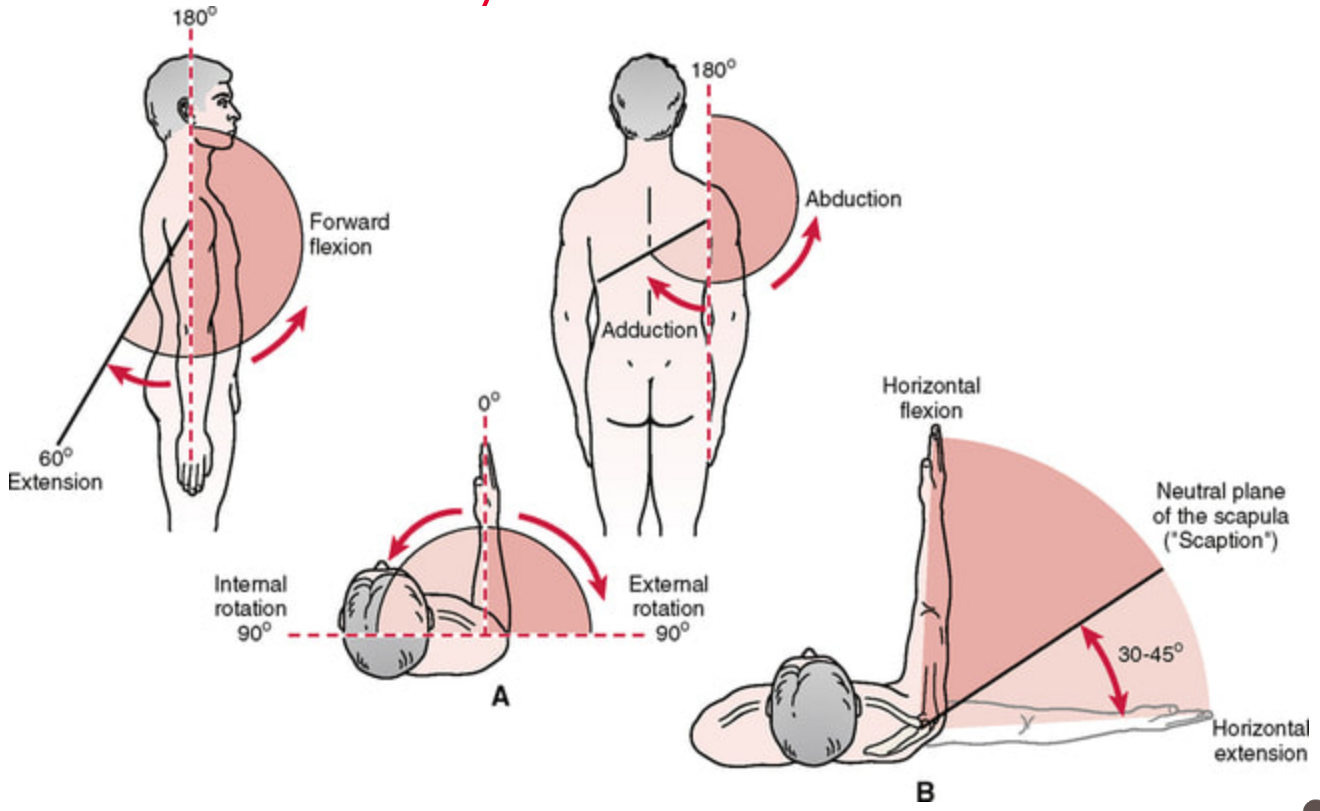
Rotator Cuff Pathology

- Spectrum of disease:
  - Strain
  - Tendinopathy
  - Impingement
- In pediatric population, atraumatic rotator cuff tears uncommon

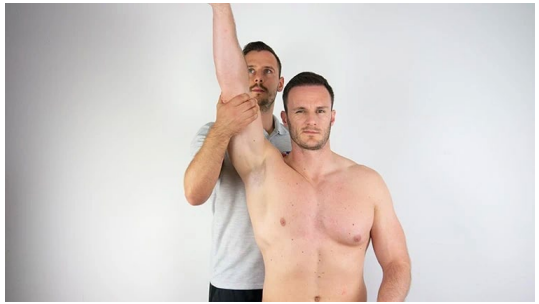
Shoulder Exam: Key Test Maneuvers

- ROM:
  - Forward flexion, Extension, Abduction
  - IR and ER in both Abduction (90 degrees), Adduction
- Empty Can / Job test
- Neer and Hawkins
- Cross-arm adduction / Scarf test

Shoulder Exam: Key Test Maneuvers



Shoulder Exam: Key Test Maneuvers



Neer test

Hawkins-Kennedy test

Jobe / Empty can test

Cross-body adduction test

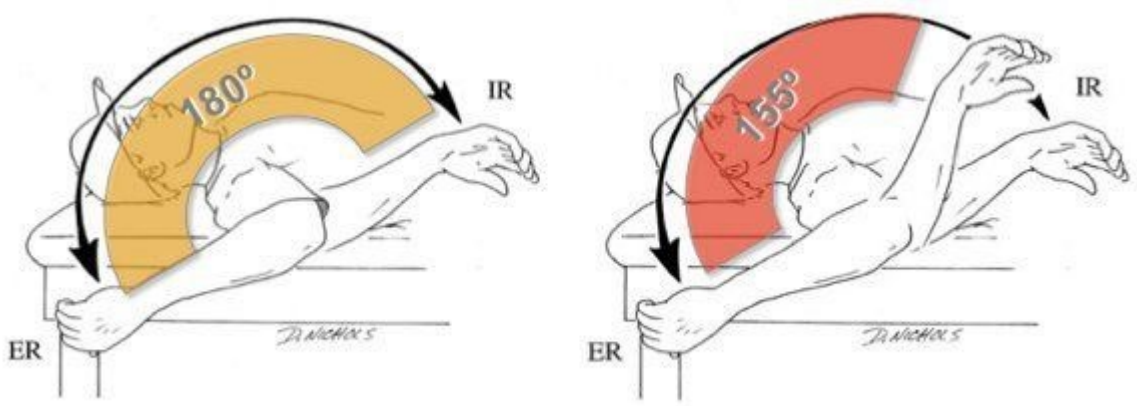
Pertinent Positives

- HPI
  - Pain with overhead or abducted activity
  - Pain with throwing/hitting
  - May occur with ADLs
- PE
  - Pain with AROM>PROM
  - Pain with resisted strength testing
  - ± Positive impingement testing (Neer and Hawkins)

Treatment

- Physical therapy:
  - Scapular stabilization
  - Rotator cuff, biceps, triceps, deltoid strength
  - Shoulder flexibility and motion
    - Correction of lost IR (GIRD)
- Throwing, overhead lifting, and pressing restrictions

GIRD: Glenohumeral internal rotation deficit



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Shoulder and Elbow Injury Prevention for Golfers

- Titleist Performance Institute Golf Performance Evaluation
- Evaluates strength and movement to optimize performance and health
- 301-576-2000, option 3
  Call for more information
  - Not covered by insurance

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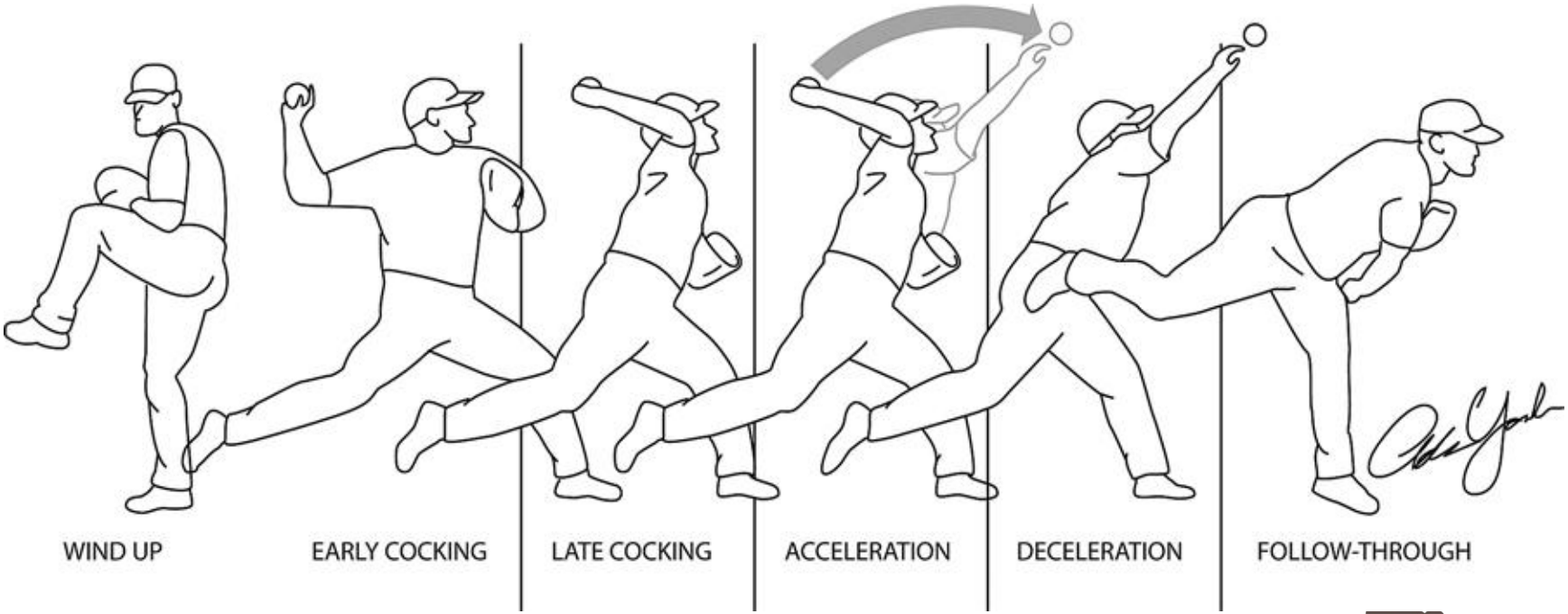
Case 5

- A 13-year-old baseball pitcher presents with persistent elbow pain with throwing. Most notably, the pain is worst at late cocking and acceleration.
- A 12-year-old volleyball hitter presents with persistent elbow pain during spiking and overhead hitting.

Phases of Throwing



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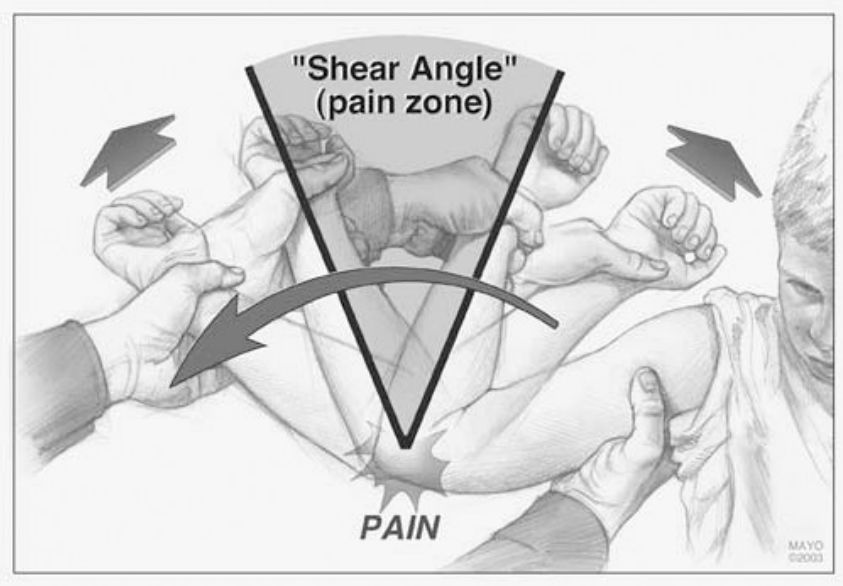
Medial Epicondylitis (Little League Elbow) (Golfer's Elbow)

- Pathology: Excessive and repetitive valgus stress on the apophysis → Repetitive traction → Inflammation, Possible widening, Possible avulsion
- Over-utilization of arm and under-utilization of core and lower extremity mechanics in overhead activity

Medial Epicondylitis: Pertinent Positives

- HPI
  - Gradual increase
  - Reduced force and velocity
  - Possibly pain with motion
- PE
  - TTP medial epicondyle
  - Pain: Resisted strength testing
  - Positive moving valgus stress test



Medial Epicondylitis: Treatment

- Complete arm rest: typically 6 weeks
  - Fully pain-free with all ROM and PE maneuvers
- Physical Therapy:
  - Wrist, elbow, and shoulder strengthening
  - Core and pelvic stabilization
  - Dynamic trunk control and hip drive
  - Guided return to throw/hit program if strength improved

Return to Throw Program

45-Ft Phase		60-Ft Phase		90-Ft Phase		120-Ft Phase	
Step 1:	A) Warm-up throwing B) 45 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 45 ft, 25 throws	Step 3:	A) Warm-up throwing B) 60 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 60 ft, 25 throws	Step 5:	A) Warm-up throwing B) 90 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 90 ft, 25 throws	Step 7:	A) Warm-up throwing B) 120 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 120 ft, 25 throws
Step 2:	A) Warm-up throwing B) 45 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 45 ft, 25 throws F) Rest 5–10 min G) Warm-up throwing H) 45 ft, 25 throws	Step 4:	A) Warm-up throwing B) 60 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 60 ft, 25 throws F) Rest 5–10 min G) Warm-up throwing H) 60 ft, 25 throws	Step 6:	A) Warm-up throwing B) 90 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 90 ft, 25 throws F) Rest 5–10 min G) Warm-up throwing H) 90 ft, 25 throws	Step 8:	A) Warm-up throwing B) 120 ft, 25 throws C) Rest 5–10 min D) Warm-up throwing E) 120 ft, 25 throws F) Rest 5–10 min G) Warm-up throwing H) 120 ft, 25 throws

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References

1. Thompson JC. *Netters Concise Orthopaedic Anatomy, Updated Edition*. Elsevier - Health Sciences Div; 2015.
2. Fulkerson JP. Diagnosis and treatment of patients with patellofemoral pain. *Am J Sports Med.* 2002;30:447-56.
3. Wride J, Bannigan K. Investigating the prevalence of anxiety and depression in people living with patellofemoral pain in the UK: the Dep-Pf Study. *Scand J Pain*. 2019;19(2):375-382. doi:10.1515/sjpain-2018-0347
4. Maclachlan LR, Matthews M, Hodges PW, Collins NJ, Vicenzino B. The psychological features of patellofemoral pain: a cross-sectional study. *Scand J Pain*. 2018;18(2):261-271. doi:10.1515/sjpain-2018-0025
5. Maclachlan LR, Collins NJ, Hodges PW, Vicenzino B. Psychological and pain profiles in persons with patellofemoral pain as the primary symptom. *Eur J Pain*. 2020;24(6):1182-1196. doi:10.1002/ejp.1563
6. Rhon DI, Roy TC, Oh RC, Young JL. Sex and Mental Health Disorder Differences Among Military Service Members With Patellofemoral Syndrome. *J Am Board Fam Med*. 2021;34(2):328-337. doi:10.3122/jabfm.2021.02.200323
7. Phyomaung PP, Dubowitz J, Cicuttini FM, et al. Are depression, anxiety and poor mental health risk factors for knee pain? A systematic review. *BMC Musculoskelet Disord*. 2014;15:10. Published 2014 Jan 9. doi:10.1186/1471-2474-15-10
8. Brodeur PG, Licht AH, Modest JM, Testa EJ, Gil JA, Cruz AI Jr. Epidemiology and Revision Rates of Pediatric ACL Reconstruction in New York State. *Am J Sports Med*. 2022;50(5):1222-1228. doi:10.1177/03635465221074694
9. Beck NA, Lawrence JTR, Nordin JD, DeFor TA, Tompkins M. ACL Tears in School-Aged Children and Adolescents Over 20 Years. *Pediatrics*. 2017;139(3):e20161877. doi:10.1542/peds.2016-1877
10. Bram JT, Magee LC, Mehta NN, Patel NM, Ganley TJ. Anterior Cruciate Ligament Injury Incidence in Adolescent Athletes: A Systematic Review and Meta-analysis. *Am J Sports Med*. 2021;49(7):1962-1972. doi:10.1177/0363546520959619
11. O'Driscoll SW, Lawton RL, Smith AM. The "moving valgus stress test" for medial collateral ligament tears of the elbow. *Am J Sports Med*. 2005;33(2):231-239. doi:10.1177/0363546504267804
12. Reinold MM, Wilk KE, Reed J, Crenshaw K, Andrews JR. Interval sport programs: guidelines for baseball, tennis, and golf. *J Orthop Sports Phys Ther*. 2002;32(6):293-298. doi:10.2519/jospt.2002.32.6.293

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2. Once you have an account, credit for this session can be claimed in one of two ways:
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    2. Visit cme.inova.org/code to enter today's session code ("ZOYFOZ") on the website.

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We welcome your questions, feedback, suggestions:

phn@childrensnational.org

THANK YOU!

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