Children’s National and the Pediatric Health Network

Overuse Syndromes and Injury Prevention

2023-08-09
Introduction and Welcome

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Community and Population Health
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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
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
Sports Physical Therapy
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
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
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
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

- Vastus intermedius muscle
- Vastus lateralis muscle
- Iliotibial tract
- Femur
- Articularis genus muscle
- Vastus medialis muscle
- Rectus femoris tendon (becoming quadriceps femoris tendon)
- Patella
- Biceps femoris tendon and its inferior subtendinous bursa
- Broken line indicates bursa deep to iliotibial tract
- Insertion of iliotibial tract to Gerdy's tubercle and oblique line of tibia
- Head of fibula
- Fibularis (peroneus) longus muscle
- Tibialis anterior muscle
- Tibial tuberosity
- Gastrocnemius muscle
- Patellar ligament

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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

<table>
<thead>
<tr>
<th></th>
<th>Sinding-Larsen-Johansson Syndrome</th>
<th>Osgood-Schlatter Disease</th>
<th>Patellar Tendinopathy</th>
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</thead>
<tbody>
<tr>
<td><strong>Pathophysiology</strong></td>
<td>Non-articular osteochondrosis</td>
<td>Non-articular osteochondrosis</td>
<td>Tendon degeneration due to impaired healing</td>
</tr>
<tr>
<td><strong>Common Age Range</strong></td>
<td>11-13yo</td>
<td>Female: 10-13yo Male: 12-14yo</td>
<td>14-16yo</td>
</tr>
<tr>
<td><strong>Possible Specific PE Findings</strong></td>
<td>TTP: Inferior patellar pole STS: Inferior patellar pole</td>
<td>TTP: Tibial tubercle STS: Tibial tubercle</td>
<td>TTP: Proximal or mid-substance patellar tendon</td>
</tr>
</tbody>
</table>
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
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-Johansson 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. Elevate to VMO if unable to perform. Consider terminal knee extensions.
- SLR: Up to 5-10lbs as tolerated.
  - If quad lag with SLR then elevating the VMO and short to long arc quads until lag resolves.
- Stretching: ITB, Quad, Hamstring, Gastroc, Heel cord.
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
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

1. Straight leg raise
2. Heel Slide
3. Quad set
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
- Cross-body adduction test
- Jobe / Empty can 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
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
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

- Wind Up
- Early Cocking
- Late Cocking
- Acceleration
- Deceleration
- Follow-Through

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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
<table>
<thead>
<tr>
<th>45-Ft Phase</th>
<th>60-Ft Phase</th>
<th>90-Ft Phase</th>
<th>120-Ft Phase</th>
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<tr>
<td><strong>Step 1:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 45 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 45 ft, 25 throws</td>
<td><strong>Step 2:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 45 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 45 ft, 25 throws</td>
<td><strong>Step 3:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 60 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 60 ft, 25 throws</td>
<td><strong>Step 4:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 60 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 60 ft, 25 throws</td>
</tr>
<tr>
<td><strong>Step 5:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 90 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 90 ft, 25 throws</td>
<td><strong>Step 6:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 90 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 90 ft, 25 throws</td>
<td><strong>Step 7:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 120 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 120 ft, 25 throws</td>
<td><strong>Step 8:</strong>&lt;br&gt;A) Warm-up throwing&lt;br&gt;B) 120 ft, 25 throws&lt;br&gt;C) Rest 5–10 min&lt;br&gt;D) Warm-up throwing&lt;br&gt;E) 120 ft, 25 throws</td>
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phn@childrensnational.org

THANK YOU!