Pediatric Overuse Injuries and Overtraining

James H. Roberson, MD
Children's Mercy Center for Sports Medicine

Disclosures

• I have nothing to disclose and no conflicts of interest.

Goals

• The learner will understand the different types of overuse injuries associated with pediatric athletes.
Objectives

• The learner will be able to counsel pediatric athletes on ways to avoid overuse injuries and overtraining.
• The learner will be able to counsel the pediatric athlete on guidelines for endurance activities.

Overuse Injuries

• Micro-trauma to the bones, joints, ligaments or tendons due to stress
  – Without sufficient time to heal
  – After or during activities
  – Can limit participation due to pain

Typical Overuse Injuries

• Little league elbow and shoulder
• Rotator cuff tendonitis
• Gymnast Wrist
• Spondylolysis
• Patellar tendonitis
• Shin Splints
• Stress fractures
Little League Shoulder

- Stress injury to the proximal humeral physis
  - Most likely in overhead use athletes (tennis players, throwers and swimmers)
  - Simple math, more activity = greater chance for pain and injury
- Pitchers and Catchers

Little League Shoulder

- Diagnosis
  - Tenderness at the proximal humerus
  - Pain with resisted throwing motion
- Imaging
  - XR shows widening of the proximal humeral physis or normal XR

[Images of X-rays showing shoulder conditions]
**Little League Shoulder**

- **Treatment**
  - Rest, rest, rest
  - 6-8 weeks off of throwing
  - PT for rotator cuff, shoulder girdle and scapular strengthening
  - Return to throw program, slowly over 2-4 weeks with supervision of mechanics

**Little League Elbow**

- **Traction Apophysitis of Medial Epicondyle**
  - Most likely in overhead use athletes (tennis players, throwers and swimmers)
  - Simple math, more activity = greater chance for pain and injury
- Pitchers and Catchers (again)

**Little League Elbow**

- **Diagnosis**
  - Tenderness at the Medial Epicondyle
  - Pain with valgus stress of the elbow
- **Imaging**
  - XR bilateral elbows
    - Avulsion is not little league elbow
Little League Elbow

- Treatment
  - Rest, rest, rest
  - 6-8 weeks off of throwing
  - PT for rotator cuff, shoulder girdle and scapular strengthening as well as core strength
  - Return to throw program, slowly over 2-4 weeks with supervision of mechanics

Pitch Counts

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Pitch Count</th>
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<tr>
<td>7-8</td>
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<tr>
<td>9-10</td>
<td>85</td>
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<tr>
<td>11-12</td>
<td>95</td>
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<tr>
<td>13-14</td>
<td>105</td>
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Ages 14 and under

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<td>51-65</td>
<td>3</td>
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<td>4</td>
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Rotator Cuff Tendonitis

- Usually older adolescents
  - Inflammation of the rotator cuff muscles/tendons due to overuse
  - Supraspinatus most likely affected, but Teres Minor, Infraspinatus and Subscapularis possible too
  - Children much less likely to tear cuff than adults

Rotator Cuff Tendonitis

- Rest - no throwing
- PT for modalities for pain and for rotator cuff strengthening and stretching
- Can return when pain free through normal arc of motion and with resisted motion

Gymnast Wrist

- Distal radial physis injury
- Widening of the physis, then sclerosis
- Repetitive trauma of weight bearing
- Premature physeal closure
Gymnast Wrist

- Treatment:
  - Rest (non-weight bearing x 6 weeks)
  - Normal XR
  - Bracing vs casting

Spondylolysis

- Stress fracture vs congenital anomaly in the pars interarticularis
  - L4-5 and L5-S1 most likely
  - Can be unilateral or bilateral
- Typically in athletes that do lower back extension repetitively
- Dx: pain on extension of low back (both legs or stork test)
- Spondylolisthesis: slippage of vertebra
Spondylolysis Imaging

- XR
  - AP, Lateral and bilateral Obliques
    - “Scotty Dog” collar or decapitation
    - Spondylolisthesis
- MRI vs CT vs Bone Scan
  - Pros and Cons

Spondylolysis treatment

- Rest, rest, rest
- Acute spondy - rest, PT, gradual return
  - Brace in rare circumstances
- Congenital
  - (+/-) rest vs PT vs return now
- Acute or progressing spondylolisthesis-referral to spine surgeon

Patellar Tendonitis

- “Jumper’s knee”
- Anterior knee pain along the patellar tendon
- More frequent in jumping and running athletes
- Inflammation and irritation in the patellar tendon
- No imaging necessary
Patellofemoral Syndrome

- Pain along the patellar border (lateral most common)
- Theater sign
- Pain gets worse with more activity
- Patellar tracking issue

Treatment

- Patellar tendonitis and patellofemoral syndrome
  - PT for hip and core strengthening
  - Quad and hamstring stretching as well
  - VMO quad strengthening is good for patellofemoral syndrome

Shin Splints

- Medial tibial stress syndrome
  - Microtrauma to the posteromedial tibia
- Continuum of stress injuries
  - Periostitis
  - Tibial stress reaction
  - Tendonopathy of the posterior tibialis tendon
Shin Splints

- **Diagnosis**
  - Tenderness along the posteromedial tibia
  - Anterior discrete pain more likely stress fracture
- **Imaging**
  - Depending on exam
  - XR vs MRI

Stress Fractures

- Tibia and metatarsals most common
- Femoral neck = dangerous
- Repetitive stress
  - Usually pain even with ADLs
  - Late evening pain is worse
  - Non-weight bearing vs cast vs boot, for 4-8 weeks
- PT to correct biomechanical issues

Female Athlete Triad

- Bone stress injury
  - Stress reaction or stress fracture
- Dysmenorrhea
  - Decreased menstruation
- Energy imbalance
  - Low energy intake compared to energy use
Female Athlete Triad

- Typically runners and straight A students
- Requires work-up for:
  - Eating disorder
  - Hormone Irregularity
  - Overtraining

Apophysitis

- Not strictly "overuse injuries"
- Typical places
  - Tibial tuberosity (Osgood-Schlatter’s)
  - Calcaneus (Sever’s)
  - Distal Pole Patella (Sendig-Larsen-Johanssen)
  - Hip apophysitis

Apophysitis

- Apophysis – growth plate at the tendon insertion or origin of a bone
- Bones grow faster than muscles and ligaments
- Pull/traction, irritation and inflammation at the Apophysis
- Can occur in non-athletes
Apophysitis - Dx

• Osgood-Schlatter’s
  – Tender at the tibial tuberosity and a “bump”
  – Pain with running and jumping or with direct contact
• Sever’s
  – Tender with heel squeeze
  – Should not extend up the Achille’s
  – Pain with running and jumping, cleats worse

Apophysitis - Treatment

• Ice daily- 20 minutes directly on the skin
• Stretching and strengthening
  – Foam roller
• Chopat strap- knee (also for jumper’s knee)
• Heel Cups- Sever’s
• Modify activity

OCD lesion

• Osteochondritis Dessicans
• Agenesis of the blood vessels
• Overlying articular chondral surface is at risk
• Idiopathic in children
• Seems to correlate with “overuse”
• Knee (75%), Ankle and Elbow
OCD lesion

• Starts with pain
• Progresses to mechanical symptoms and swelling
• Ultimately can result in a loose body in the knee

OCD lesion

• Treatment
  – Rest
  – Bracing? Casting?
  – Surgery

Overtraining Syndrome

• Series of psychological, physiologic, and hormonal changes that result in decreased sports performance
Overtraining Syndrome

• One sport year round athletes
• Multisport athletes with no breaks
• Multisport athlete with similar repetitive motions

Specialization

• Early Specialization likely leads to:
  – Increased overuse injuries
  – Burnout
• Late Specialization likely leads to:
  – Improved skill development (transfer)
  – More fun and self determination

Prevention of Burnout

• Limit sport specialization until 12-16 years old
• 3 months off of organized sports or training yearly
• 1-2 days off a week from organized sports
• Emphasis on skill development over strict competition
Overuse Injury Prevention

• Limit yearly/weekly organized sport participation ("growth spurt")
• Proper preseason training and conditioning (core strengthening)
• Watch for menstrual dysfunction in female athletes

Bibliography