You are Overdoing it, Stop that!
Pediatric Overuse Injuries and Overtraining

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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 treatment for overuse injuries.
Overuse Injuries

- Micro-trauma to the bones, joints, ligaments or tendons due to stress
  - Without sufficient time to heal
  - Pain 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/patellofemoral syndrome
- Shin Splints
- Stress fractures (female athlete triad)
- OCD lesion
Case #1

- 13 y/o male R handed pitcher with R shoulder pain that occurred with throwing for 3 months. Over the last 2 weeks it has gotten bad enough that the pain persists even at rest sometimes. He does not recall any injury and denies popping, locking or swelling of the shoulder. Pitches 1-2 games a weekend with innings limits based on the league rules. He does private pitching lessons year round.
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
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
Case #2

- 14 y/o male L handed pitcher/catcher with L elbow pain that occurred with throwing for 2 months. Now it even hurts with batting. He does not recall any injury, pop or one throw that started the pain. He denies popping, locking or swelling of the elbow. Pitches less than 1 game a weekend but catches most games for his team (up to 6 in a weekend). He takes 2 months off of baseball in the winter, but does private lessons at that time.
Little League Elbow

- Traction Apophysitis of Medial Epicondyle
  - Most likely in overhead use athletes (almost exclusively throwers)
  - 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
Palpation of medial joint line while valgus stress is placed on a 30° flexed 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</th>
<th>Pitches per Game</th>
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<tbody>
<tr>
<td>7-8</td>
<td>50</td>
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<tr>
<td>9-10</td>
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<td>11-12</td>
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<tr>
<td>13-16</td>
<td>95</td>
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<tr>
<td>17-18</td>
<td>105</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Ages 14 and under</th>
<th>Ages 15-18</th>
<th>Days of rest</th>
</tr>
</thead>
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<tr>
<td>66+</td>
<td>76+</td>
<td>4 calendar days</td>
</tr>
<tr>
<td>51-65</td>
<td>61-75</td>
<td>3 calendar days</td>
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<tr>
<td>36-50</td>
<td>46-60</td>
<td>2 calendar days</td>
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<tr>
<td>21-35</td>
<td>31-45</td>
<td>1 calendar day</td>
</tr>
<tr>
<td>1-20</td>
<td>1-30</td>
<td>none</td>
</tr>
</tbody>
</table>
Case #3

- 17 y/o male pitcher with R shoulder pain. He recalls a particularly difficult pitching outing about a week ago when the pain started. He did feel some instability on one throw and has had pain with throwing or other overhead motions since then. Batting also hurts, but not nearly as much.
Rotator Cuff Tendonitis

- Usually older adolescents
  - Inflammation of the rotator cuff muscles/tendons due to overuse
  - Supraspinatus most common
    - Teres Minor, Infraspinatus and Subscapularis possible
  - 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 active and resisted arc of motion
Case #4

- 12 y/o female gymnast with bilateral wrist pain. She has actually been dealing with the pain for 6 months, but did not tell her mom until 2 weeks ago. She did tell the coach, but he said it was probably just some normal aching and told her to push through it. The pain is on the distal radius bilaterally.
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
Case #5

- 15 y/o male football player (L tackle) with low back pain for the last year. He states that it started during football last year, but after the season it got better. He has had mild pain when he is not active, but with football and weight lifting (squats and cleans are the worst) he gets the sharp low back pain. Denies numbness or tingling in the LE bilaterally.
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 Oblique**
  - “Scotty Dog” collar or decapitation
  - Spondylolisthesis

- **MRI vs CT vs Bone Scan**
  - Pros and Cons
Spondylolysis treatment

- Rest, rest, rest
- Acute spondylolisthesis - rest, PT, gradual return
  - Brace in rare circumstances
- Congenital/Chronic
  - (+/-) rest vs PT vs return now
- Acute or progressing spondylolisthesis - referral to spine surgeon
Case #6

- 16 y/o female basketball player with R anterior knee pain. The pain occurs mostly with activity, but sometimes hurts for several hours after her games. The pain is in the patellar tendon area. Denies swelling, locking or popping in the knee.
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
Case #7

- 14 y/o female XC runner. Pain in the bilateral knees for the last 8 months with running, soccer and PE. She denies any injury to the knee. She does have some pain when she sits for long periods of time. Denies swelling, locking or popping in the knees.
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
  - Relative rest
  - PT for hip and core strengthening
  - Quad and hamstring stretching as well
  - VMO (quad) proper firing
Case #8

- 15 y/o male XC runner with bilateral shin pain. It has been going on since the first week of the season (6 weeks) and is getting worse each week. He was in enough pain at the last meet that he had to drop out halfway through. He denies pain with ADLs and has no noticed any swelling in the shins.
Shin Splints

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

- Diagnosis
  - Tenderness along the posteromedial tibia
  - Anterior discrete pain more likely stress fracture

- Imaging
  - Depending on exam
  - XR vs MRI vs bone scan vs CT
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
Case #9

- 15 y/o female XC and long distance track runner with stress fracture in the R foot. She does long distance running for pleasure in the off season. She is a straight A student and is very health conscious. She has had 2 other stress fractures in the shin and the other foot in the last 2 years. She had her first period at age 11, but she only has 2 per year at this time.
Female Athlete Triad

- **Bone stress injury**
  - Stress reaction or stress fracture

- **Dysmenorrhea**
  - Decreased menstruation

- **Energy imbalance**
  - Low energy intake compared to energy use
The Female Athlete Triad

Low Energy Availability with or without an Eating Disorder

Reduced Energy Availability with or without Disordered Eating

Regular, Consistent Menstrual Cycles

Subclinical Menstrual Disturbances

Optimal Energy Availability

Optimal Bone Health

Functional Hypothalamic Amenorrhea

Osteoporosis

Low Bone Mineral Density

Figure 1: The spectrums of the Female Athlete Triad including energy availability, menstrual function and bone mineral density exist on a continuum between health and disease.
Female Athlete Triad

- Typically runners and straight A students
- Requires work-up for:
  - Eating disorder, Nutrition consult
  - Hormone Irregularity
  - Overtraining
Case #10

- 10 y/o male with bilateral heel pain for the last 6 months. It only occurs with activity and goes away with rest. He has the most pain with soccer, but even PE and recess cause some pain. He denies any injury to the feet. He has been told that he needs to wear CAM boots for the next 6 weeks and stop playing soccer. They come to see you for a second opinion.
Apophysitis

- Not strictly “overuse injuries”
- Typical places
  - Tibia tuberosity (Osgood-Schlatter)
  - Calcaneus (Sever)
  - Distal Pole Patella (Sendig-Larsen-Johanssen)
  - 5th metatarsal (Iselin)
  - 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 tibia tuberosity and a “bump”
  - Pain with running and jumping or with direct contact

- **Sever’s**
  - Tender with heel squeeze
  - Should not extend up the Achilles'
  - 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 (aka. Relative Rest)
Case #11

- 11 y/o male with R knee pain for 4 months. He did have some swelling a few times and had some popping but he has continued playing. His dad has told him just to “walk it off” numerous times. Mom is concerned that he is not as forthcoming about the pain as he should be. She notices him limping quite often during baseball and basketball.
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
  - 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
- REST
Bibliography