When growing pains are not growing pains

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Differential Diagnosis

- Fracture
- Ligament Injury
- Dislocation
- Cartilage Injury
- Apophysitis
  - Inflammation at growth plate at the site of a tendon insertion
- Patellofemoral Pain
- Osteochondral Lesions
Differential Diagnosis

- Arthritis
- Infection
- Tumors – benign and malignant
- Avascular Necrosis of the bone
- Metabolic Disease
- “Burnt out” athletes with somatic complaints
- Referred Pain Mimicking an Injury -- Slipped Capital Femoral Epiphysis
- Soft Tissue Injury or Muscle deconditioning

Lower Extremity Injuries
The Differential Diagnosis

- Fracture
- Soft Tissue Injury
- Referred Pain Mimicking an Injury -- Slipped Capital Femoral Epiphysis
What are growing pains?

- Nondescript pain
- Often at the end of the day – may complain at night but usually complaining at bedtime
- Usually involves the legs
- Usually is bilateral – not always at the same time
- We think it is related to muscle, and nerve growth triggered by bone growth
- Many children with growing pains are “tight”
  - Not flexible – for example they cannot touch their toes

What are NOT growing pains?

- Joint Swelling
- Limp
- Loss of motion of a joint
- Gowers sign – having to use arms on legs to “push” themselves up from a sitting position on the floor
- Night Pain – waking up in the middle of the night consistently
- Pain related to activity
- Constitutional Symptoms such as fever
The History

- How, When and Where?
- Swelling?
- Ability to Ambulate?
- Did you hear or feel a Pop?
- Did you Relocate an Injured part?
- Waking up at night?
- What makes it feel better?
- Activity Related?

Warning Signs and Symptoms

- Systemic Symptoms- fever, weight loss
- Trunk Shift
- Neurologic Deficit
- Night Pain
- Pain with Cough or Valsalva
- Functional Disability
- Joint Swelling or Warmth
- Cellulitis
- Muscle Atrophy
- Asymmetric Joint Motion
The Physical Examination

• Have the patient demonstrate the area of maximal tenderness
• Use one finger to localize tenderness
• Is the tenderness located over the bone or the soft tissues?

Orthopaedic Clinical Anatomy

Parts of a growing bone
• Epiphysis
• Physis
• Metaphysis
• Diaphysis
Physeal Fracture Patterns

Injury Terms:

Sprain vs. Strain
14 y.o. girl – cheer with back pain

- Constant
- Worse after activity
- Pain at rest
- Waist shift
- Told she has scoliosis
- Night Pain
- Neuro exam preserved
  – Complains of leg pain below knee to foot
PA radiograph with waist shift

Osteoblastoma of Posterior Elements
Osteoblastoma of Posterior Elements

- Treatment is Surgical Excision

9 y.o. girl cheer with back pain

- Has missed school
- Has stopped her activities
- Very stiff
- Rest does improve the pain
- Ibuprofen little help
- No leg pain
- Started after back flips
- Pain for 2 months
9 y.o. girl cheer with spondylololisthesis

- Rest
- Boston Overlap Brace
- Core Strengthening
- Rarely surgical intervention
14 year old boy with back pain

• Pop with long jump landing
• Immediate pain – more on left than right.
• Relieved somewhat with rest
• Very stiff on exam with slight forward lean with ambulation
• Neuro exam intact but very tight hamstrings

14 year old boy with back pain - edema in pedicle
15 y.o. boy lifting weights

- Immediate pain
- Down both legs
- Stiff
- Tight hamstrings
- Constant Pain
- Neuro exam is preserved
15 y.o. boy lifting weights. 
Apophyseal Central Disc Herniation

14 y.o. girl Basketball.
Discitis and Vertebral Osteomyelitis

- Late MRI years later

Little League Shoulder

- Tenderness over the proximal humerus – inflammation and bone resorptions at the physis – the growth plate
Little League Shoulder

- Tenderness over the proximal humerus
- Rest from throwing for an average of 3 months
- Shoulder strengthening
- Throwing Mechanics

Little League Elbow
(Medial Epicondylitis)

- Repetitive valgus stresses cause microfractures in the apophyseal cartilage (weak link)
- Common in 10-13 year olds
- Avulsion fractures may occur suddenly when throwing
Throwing Motion Forces

- 4 distinct areas affected:
  1. Medial tension on medial epicondyle and MCL
  2. Lateral compression on radiocapitellar joint
  3. Posteromedial shear forces on posterior articular surface
  4. Extension overload forces on lateral restraints

Little Leaguer’s Elbow

- Medial epicondyle apophysitis
- X-ray findings
  1. Comparison views
  2. Widened apophysis
Little Leaguer’s Elbow

- Medial epicondyle apophysitis

Olecranon Apophysitis/Stress Fractures

- Activity related pain and tenderness over the olecranon process

- X-rays fragmentation or persistent widening of the olecranon process
Elbow Pain

• Little League Elbow
  – Medial epicondyle

Injury prevention in the throwing athlete

➢ Recommended pitch counts:
  1. In competition or game intensity workouts

<table>
<thead>
<tr>
<th>Age</th>
<th>Pitches per game</th>
<th>Pitches per week (age X 10)</th>
<th>Pitches per season</th>
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<tbody>
<tr>
<td>8-10</td>
<td>50</td>
<td>80-100</td>
<td>650</td>
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<tr>
<td>11-12</td>
<td>60</td>
<td>110-120</td>
<td>650</td>
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<tr>
<td>13-14</td>
<td>70</td>
<td>130-140</td>
<td>650</td>
</tr>
<tr>
<td>15-17</td>
<td>80</td>
<td>150-160</td>
<td>?</td>
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</table>
Injury prevention in the throwing athlete

- **Seasonal Participation**
  - Limit to 9 MONTHS per year
  - 3 months off from pitching
  - Limit to ONE TEAM per season!

- **Pitch Type**
  - Emphasize proper mechanics of fastball/change up
  - NO breaking balls (slider, curveball) until skeletal maturity (age 14-16)

<table>
<thead>
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<th>Age to Throw</th>
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<tbody>
<tr>
<td>Fastball</td>
<td>8</td>
</tr>
<tr>
<td>Change Up</td>
<td>10</td>
</tr>
<tr>
<td>Curveball</td>
<td>14</td>
</tr>
<tr>
<td>Slider</td>
<td>16</td>
</tr>
<tr>
<td>Split Finger</td>
<td>17</td>
</tr>
</tbody>
</table>

- Number of pitches per season may be more important than mechanics
- Harder throwing kids are at increased risk
- “No pain, no gain” is not appropriate for skeletally immature athletes. A parent or coach can ruin a kid’s elbow with this philosophy.
Pelvic Injuries

- Iliac apophysitis
- Anterior superior iliac spine
- Anterior inferior iliac spine
- Ischial tuberosity
- Slipped capital femoralepiphysis (SCFE)
Referred Hip Pain

- Anterior Groin
- Anterior Thigh and Knee
- Related to Obturator Nerve Sensory Distribution

Bone Cyst

- 6 year old with persistent limp, thigh and knee pain with activity, thigh atrophy
Physical Exam - Atrophy

Physical Exam – Loss of Rotation
Physical Exam – Loss of Rotation

Trendelenburg
Obligatory External Rotation with hip flexion

Slipped Capital Femoral Epiphysis
SCFE: Radiographs

Note the screw position on AP and Lateral
Insitu Screw Fixation for SCFE
SCFE - Crescent Sign

Perthes

Increased Density  Subchondral Fracture
Apophysitis

- Patella – Sinding Larsen Johannson
- Tibia – Osgood Schlatter
- Calcaneus - Severs

- Apophysitis of Tibial Tubercle
Osgood Schlatter

- 15% of boys
- 10% of girls
- Traction Apophysitis

Sinding-Larsen-Johannson

- Apophysitis of Inferior Pole of Patella
Patellofemoral Articulation

Chondromalacia of Trochlear Groove
Femur
Patellofemoral Pain

• Typically Complain of
  • Dull aching pain, anterior knee, but hard to localize
  • Increased with activities but present at other times
  • Occasional “swelling” - puffiness, not effusion

Patellofemoral Pain

• Typically Complain of
  • Often several months of pain
  • Increases with stairs and prolonged sitting
  • New running sport or other activity just prior to onset
Differentiating Septic Arthritis and Transient Synovitis

- History of Fever
- Non-weight bearing
- ESR greater than 40 mm/hour
- WBC greater than 12,000

Differentiating Septic Arthritis and Transient Synovitis

- Four Predictors 99.6%
- Three Predictors 93.1%
- Two Predictors 40.0%
- One Predictor 3.0%
- Zero Predictor 0.2%