Differentiating Common from Uncommon Pediatric Joint Pain

Ian McLeod, PA-C, ATC
Assistant Professor
2015 ASAPA Fall CME Conference

Objectives
1. Define osteochondrosis and list the common locations where osteochondrosis develops.
2. Describe the etiology of osteochondrosis.
3. Describe the expected clinical presentations for the common types of osteochondrosis.
4. Identify pertinent historical, physical exam or diagnostic study findings that can be used to differentiate between common and uncommon causes of joint pediatric and adolescent joint pain.
5. Discuss treatment approaches for the common types of osteochondrosis.

Terminology 101
- **Apophysis**
  - Boney outgrowth that arises from a separate ossification center and ultimately fuses with the bone
  - Site of tendon or ligament attachment
- **Traction apophysitis**
  - Repetitive traction load can lead to microtrauma
  - Excessive force may result in avulsion fracture
Terminology 101

- **Epiphysis**
  - End of long bones
- **Physis**
  - Growth plate
- **Metaphysis**
  - Wide portion of bone between epiphysis and narrow diaphysis
- **Diaphysis**
  - Shaft (center) of a long bone

What is Osteochondrosis?

- Group of disorders affecting the growing skeleton
- Self-limiting developmental derangement of normal bone growth in which centers of ossification undergo:
  1. Necrosis
  2. Resorption
  3. Repair
Ossification Center Necrosis

- Aseptic necrosis
- Vascular deficit theory → ischemia
  - Multiple additive traumas
  - Single traumatic event
  - Primary vascular event

Ossification Center Resorption

- Sclerosis and fragmentation of the epiphysis
Ossification Center Repair

- Following resorption, necrotic bone is replaced
- Reossification occurs gradually over 1-2 years
- Adequacy of replacement dependent upon:
  - Timing of intervention
  - Degree of necrosis / resorption
  - Congruity of involved joint
  - Patient’s age
  - Other physiological and mechanical factors

Osteochondrosis ≠ Osteochondritis dessicans

Common Trunk / Upper Extremity Locations
Common Lower Extremity Locations

Pediatric Elbow Pain

- Little league elbow
  - Medial epicondyle apophysitis
  - Medial epicondyle avulsion fx
  - Capitellar necrosis
  - Osteochondritis dessicans
    - Capitellum > radial head

Medial Epicondyle Apophysitis

- 9 – 12 y/o
- Dominant UE in boys
- History of repetitive activity
  - MC dual tasking with baseball
- Complaints of:
  - Gradual onset of medial elbow pain
  - +/- swelling
Medial Epicondyle Apophysitis

• Physical exam
  – Medial epicondyle tenderness
  – Pain with active wrist extension and passive wrist flexion
  – Pain with moving valgus stress test
  – No valgus laxity

Medial Epicondyle Apophysitis

Medial Epicondyle Apophysitis

• Treatment
  – Good outcomes with conservative care
  – Symptomatic care (e.g., Ice, APAP, NSAIDs)
  – No throwing 4 – 6 weeks and clinically non-tender to palpation
  – Physical therapy
  – Progressive throwing program over 6 – 8 weeks

• Prevention
  – Discourage specialization
  – USA Baseball Medical and Safety Advisory Committee
    • 75-125 pitches/week
    • 50-75 pitches/outing
Medial Epicondyle Avulsion Fracture

- 12 – 17 y/o
- Dominant arm in boys
- Complaints of:
  - Abrupt medial pain (late cocking) with single throw
  - “Pop” at time of injury
  - Focal swelling

Physical exam
- Will guard extremity
- Focal swelling
- Significant medial epicondyle tenderness
- Pain with valgus stress
- +/- laxity with valgus stress

Imaging
- Radiographs
- MRI
Medial Epicondyle Avulsion Fracture

- Treatment
  - Nondisplaced
    • Cast 4-6 weeks
  - 3-10 mm
    • Conservative or surgical
    • Throwing athletes
      - Repair > 3-5 mm
  - >1 cm displacement
    • Surgical repair

Capitellar Necrosis “Panner’s Disease”

- 7 – 12 y/o
- Males
- Dominant or non-dominant extremity
- Complaints of:
  - Rapid pain onset
  - Deep or lateral pain
  - Limited extension range of motion
  - No locking sensation

Capitellar Necrosis “Panner’s Disease”

- Physical exam
  - +/- swelling
  - Difficult to elicit tenderness with palpation
  - Pain / guarding with passive extension
  - Lateral pain with valgus stress
Capitellar Necrosis “Panner’s Disease”

- Fragmentation of capitellum
  - Sclerosis and fragmentation

Capitellar Necrosis “Panner’s Disease”

- Treatment
  - Good outcomes with conservative care
  - Symptomatic care
  - +/- physical therapy
  - Avoidance of elbow stress for typically 6 – 12 weeks
    - Symptom free
    - Unremarkable physical exam
    - Radiographic healing
  - Gradual return to activity

Osteochondritis Dessicans

- 12 – 16 y/o
- Dominant or non-dominant UE
- Repetitive activity
  - Baseball
  - Gymnastics
- Complaints of:
  - Gradual onset of poorly localized lateral or deep pain
  - Decreased motion
  - (+) popping, locking &/or catching
Osteochondritis Dessicans

- Physical exam
  - +/- swelling
  - Difficult to elicit tenderness with palpation
  - Pain / guarding with passive motion
  - Lateral pain with valgus stress
- Imaging
  - X-rays - flattening of w/ crater
  - MRI if x-rays inconclusive
- Ortho referral

Alteration of Thoracic Kyphosis

- Congenital
- Postural
- Developmental

Congenital Alteration
Postural Alteration

Developmental Alteration

Scheuermann’s Kyphosis

- 10 – 12 y/o
- M:F of 4:1
- Typical present with pain and +/- deformity
- Anterior portion of vertebra grow slower leading to wedge shaped vertebra
- Rigid deformity / structural kyphosis
Rigid Deformity / Structural Kyphosis

- Anterior wedging – ≥5° in at least three adjacent vertebral bodies

Scheuermann’s Kyphosis

- Cobb angle
  - Endplates of vertebrae
  - Distal ends of the curve
  - Used to determine the maximum angle of the curve
Scheuermann’s Kyphosis

• Treatment
  – Stretching / strengthening
  – Bracing if kyphosis exceeds 55-60° until skeletally mature
  
  Department of PA Studies  A.T. Still University  ATSU

Scheuermann’s Kyphosis

• Treatment
  – Rarely surgical options considered
    • Skeletal maturity
    • Pain unresponsive to conservative care
    • Rigid deformity
    • Kyphosis > 75°
    • Unacceptable appearance
  
  Department of PA Studies  A.T. Still University  ATSU

Pediatric Hip Pain

• Legg-Calvé-Perthes disease
• Snapping hip syndrome
• Slipped Capital Femoral Epiphysis (SCFE)
Legg-Calvé-Perthes Disease

• Interruption of blood supply to the immature femoral head
• M:F of 4:1
• 10% familial origin
• 3 – 12 y/o range (peak 4 – 8)
• MC Unilateral (10 – 20% b/l)
• Complaints of:
  – Insidious onset of vague hip pain that can refer to the knee
  – Limited hip motion
  – Limp

Legg-Calvé-Perthes Disease

• Physical exam
  – Range of motion limitations
    • Abduction
    • Internal rotation (+ log roll test)
  – +/- leg length discrepancy
  – Trendelenburg gait

Legg-Calvé-Perthes Disease

• X-ray findings categorized into Ficat stages
  – I - Normal
  – II - Sclerotic or cystic lesions, without subchondral fracture
  – III - Crescent sign only
  – IV – Sclerosis and fragmentation
Legg-Calvé-Perthes Disease

- Radiographs
  - Crescent sign often the earliest finding

Legg-Calvé-Perthes Disease

- MRI
  - Study of choice for early detection

- Treatment
  - Early detection vital for reducing risk of early onset arthritis and preserving ROM
  - NWB and ortho referral
    - PT
    - Bracing
    - Occasionally surgery
**Snapping Hip Syndrome**

- **Common locations**
  - Iliotibial band over the greater trochanter / trochanteric bursa
  - Iliopsoas over anterior femoracetabular joint / iliofemoral bursa
- **Occurs with walking or rotation of hip**
- **Often painless unless bursitis or labral pathology develops**
- **Painful or activity limiting**
  - Radiographs r/o bony or intra-articular pathology
  - MR arthrogram r/o intra-articular loose bodies and / or labral pathology

**Slipped Capital Femoral Epiphysis (SCFE)**

**Pediatric Knee Pain**

- **Patellar tendon apophysitis**
  - Osgood-Schlatter Disease (OSD)
  - Sinding-Larsen-Johansson Disease (SLJD)
- **Patellofemoral Pain Syndrome (PFPS)**
- **Osteochondritis Descicans**
Extensor Mechanism of the Knee

- Comprised of:
  - Quadriceps muscles
  - Quadriceps tendon
  - Patella
  - Patellar tendon

Patellar Tendon Apophysitis

- OSD & SLJD
  - 10 – 14 y/o
  - >50% engaged in regular athletic activity
  - ~30% have bilateral involvement
- Complaints of:
  - Gradual pain onset
  - Increase pain with loading activities or direct pressure

Osgood-Schlatter Disease
Patellar Tendon Apophysitis

- Treatment
  - Relative rest
  - Symptomatic care
  - Patellar tendon/straps
  - Physical therapy
    - Improve flexibility/strength
    - Improve landing skills

Patellofemoral Pain Syndrome

- Diffuse, aching anterior knee pain that increases with activities
- Related to overuse/overloading patellofemoral joint
- Risk factors include:
  - Increased Q angle
  - Hyperpronation
- Pathologic changes involving articular surface of patella and condyle ("chondromalacia")

PFPS - Quadriceps Angle (Q angle)

- Draw a line from the ASIS through the center of the patella
- Second line is drawn which transects the center of the patella and the tibial tuberosity
- Females
  - < 22 degrees in full extension
- Males
  - < 18 degrees in full extension
PFPS - Hyperpronation

Patellofemoral Pain Syndrome

• “Movie theater sign”
• Pain after increase in activity level or weight training
• “J” sign
• + patellar grind

PFPS - Treatment

• Relative rest
• Symptomatic care
• Weight loss if obese
• Physical therapy
  – Iliotibial band stretching
  – VMO strengthening
  – Gluteal strengthening
• Patellar stabilization sleeve or brace
• Patellar taping
Osteochondritis Dessicans

- 10 – 20 y/o
- M:F of 2:3:1
- 85% occur medial femoral condyle
- Complaints of:
  - Vague pain, stiffness, swelling, clicking and/or occasional locking
- Physical exam
  - +/- effusion and antalgic gait
  - Boney &/or joint line tenderness
  - + meniscal tests

Pediatric Foot & Ankle Pain

- Sever disease
- Achilles tendonitis
- Köhler disease
- Freiberg disease

Calcaneal Apophysitis “Sever Disease”

- 9 – 11 y/o
- M=F
- Athletic population
  - Soccer
  - Gymnastics
- Bilateral involvement
- Pain with loading activities
Calcaneal Apophysitis “Sever Disease”

- Physical exam
  - Pain with mediolateral compression of the calcaneal apophysis
  - Tight heel cords
  - Weak ankle dorsiflexors

- Imaging
  - X-rays have poor specificity

Calcaneal Apophysitis “Sever Disease”

- Treatment
  - Symptomatic care
  - Relative rest
  - Heel cord stretching and dorsiflexor strengthening
  - Turf shoes for soccer
  - Heel cups for gymnastics

Achilles Tendonitis

- Presentation
  - Pain (proximal to calcaneal insertion)
  - Morning pain / stiffness
  - Swelling / thickening of the tendon
  - Palpable crepitus
Normal vs. Swollen Achilles

Achilles Inflammation & Thickening

Köhler disease

- 2 – 8 y/o
- M:F of 3-5:1
- Atraumatic onset
- Medial foot pain & limp
- Tender over navicular
- Pain with resisted inversion
- Typical recovery time of 8 weeks
  - Research regarding benefits of immobilization is inconclusive
Freiberg disease

- Adolescent girls participating in dance
- Metatarsal head
  - 2nd > 3rd > 4th
- Gradual pain onset
- Pain increases with loading activities
- + swelling & pain w/ palpation

Freiberg disease

- Treatment
  - Symptomatic care
  - Activity modification
  - Metatarsal pad
  - Supportive footwear

Questions?