Approach to the Pediatric Knee Injury

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Disclosures

• I have no conflicts of interest or financial disclosures
Objectives

• Review anatomical differences in the pediatric knee

• Discuss the clinical approach to unique pediatric knee injuries/pathology
Children Are Not Little Adults

- Open physes are weaker
- Lack of flexibility
- Poor mechanics (especially at puberty)
Anatomy
Salter-Harris Classification

The Salter-Harris Classification of Growth Plate Injuries

Adapted from Disorders and Injuries of the Musculoskeletal System, 3rd Edition.
Robert B. Salter, Baltimore, Williams and Wilkins, 1999. Used with the author's permission.
X-rays
Approach to Pediatric Athlete

- Detailed history
  - Acute injury vs insidious
  - Mechanism
  - Weight-bearing status
  - Specific location of pain
  - Mechanical symptoms

- Focused examination
  - Inspection
  - Palpation
  - ROM
  - Strength
  - Special Tests
  - Mechanics
Insidious Onset
Osteochondritis Dissecans

- Injury to subchondral bone and articular cartilage
- Typically overuse
- Location
- X-rays
- MRI
- Increased healing potential
- Conservative vs surgical management
- 3-6 months to return to sport
Patellofemoral Syndrome

- Anterior knee pain
- Crepitus and popping, ?swelling
- Pain with patellar grind/compression
- Increased risk if mechanical problem
- Strong evidence for weakness of abductor and ext rotators vs healthy controls (Prins 2009 systematic review)
- X-rays: normal or lateral patellar tilt
- Treat with PT, brace?, activity modification, NSAIDs

Houghton 2007, Prins 2009
Apophysitis

- Osgood Schlatter’s Disease
- Traction at tibial tubercle
- Tender, swelling, weakness with resisted extension
- Treat with stretching, activity modification, Chopat strap
- Beware of tibial tubercle avulsion fracture
Apophysitis

- Sinding-Larsen-Johanssen
- Inferior pole of patella
- Similar to Osgood
- Beware of patellar sleeve fracture
Acute Injury
ACL Tear

- Similar mechanism and presentation to adults
- Delaying reconstruction leads to worse functional outcomes
- All-epiphyseal reconstruction superior
Patellar Instability

- Lateral dislocation
- Subluxation vs Dislocation
- Effusion
- Medial and lateral pain
- Patellar apprehension
- X-ray: include sunrise view
- MRI for chondral injury
- Immobilize for 2-4 weeks then PT
Fractures

The Salter-Harris Classification of Growth Plate Injuries

Distal Femur Fracture

- 5% of all physeal injuries
- SH-2 most common
- AP and lateral knee x-rays; MRI if needed
- Long leg casting unless displaced
- Monitor for growth arrest
Acute injury; tender at distal femur; unable to fully weight bear
Proximal Tibia Fractures

- <1% of all pediatric fractures
- AP and lateral views; oblique view may be helpful
- MRI if uncertain soft tissue injury
- CT for possible displacement and for SH-3 and 4
- SH-1 and 2: long leg cast in slight flexion
- Growth disturbance in up to 25%
Tibial Spine Avulsion

- X-ray with knee in extension to evaluate for reduction
- MRI for soft tissue injury including ACL tear
- Treatment: Immobilization in 0-20° of extension
Tibial Tubercle and Patellar Sleeve Avulsion

- Conservative management if minimally displaced and intact extensor mechanism
- Immobilize x4 weeks
- Brace in extension x2-4 weeks with PT
- Then progress in PT back to activity
Summary

• Good history and examination

• Look for mechanics/flexibility issues, especially with chronic/insidious onset knee pain

• Monitor growth for physeal injuries
References