40th Annual Symposium on Sports Medicine

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Knee Injuries In The Pediatric Athlete

Disclosure

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Goals of Talk

1. Improved knowledge of, and recognition of common pediatric knee problems
2. Improved ability to initiate treatment of common pediatric knee problems
3. Consideration of other conditions that may mimic injuries

Adolescent Athletes

- Significant increase in participation
  - 1970 to 2010
  - Males 3.75 to 4.5 million
  - Females 300,000 to 3.25 million
- Trend for shift from “free play” to year-long involvement
- 1996 Cost $1 Billion

American Academy of Pediatrics

- “The AAP recommends that athletes play sports for enjoyment, to improve self-esteem, and to improve athletic skills”
- “If these are not priorities in youth sports, then participation in sports potentially is harmful because it can decrease self-esteem, diminish athletic skills, and discourage additional participation in sports”
General Categories

- Overuse Injuries
- Soft Tissue Injuries
- Bony Injuries
- Resources

Successful Workup & Treatment

- Appropriate History
- Thorough Physical Exam
- Understanding anatomy
- Thoughtful DDX
- Evaluation of treatment success
  - Reconsider DDX

Osgood-Schlatter

- Point tenderness over tibial tuberosity
- Activity related pain
- Free ossicle can persist after maturity
  - Consider excision if symptomatic

- Tx
  - Rest
  - Ice
  - Stretching
Infrapatellar Tendonitis/ Sinding-Larsen-Johansson

- Symptoms similar to Osgood-Schlatter
- Location at inferior pole of patella
- Tx:
  - Rest
  - Ice
  - Stretching

“Anterior Knee Pain”

- Vague, periarticular pain in anterior knee
- Differential diagnosis physical exam, labs and imaging
- Physical Exam:
  - Gait
  - Mechanical examination
  - Core strength assessment
  - Single leg squat
  - Thorough physical exam of entire lower extremity

Initial Tx:
- Core strengthening
- Pelvis/Quad muscle strengthening
- Other Diagnoses seen personally:
  - Osteoblastoma
  - Femoral antversion
  - Tibial torsion
  - Plica
  - Patellar instability

“Knee Sprain”

- Periarticular soft tissue injury
- Non specific term; could include:
  - Collateral ligament
  - Cruciate ligament
  - Capsular strain
  - Hamstring strain
  - No bony injury
  - Typically self-limited

Grading
- Grade 1
  - Stretch of soft tissue
- Grade 2
  - Partial tear
- Grade 3
  - Complete tear

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Physeal Fracture

- Not a “knee sprain”
- Bony tenderness at physis of distal femur, tibia, fibula
- Risk for increased injury, growth arrest if missed
- Better to treat “knee sprain” as fracture if in doubt
- Imaging

The Acute Hemarthrosis

- Ligament tear
- Meniscal tear
- Meniscal tear
- Osteochondral Fracture
- Fracture/Physeal injury
- Patellar Dislocation

Meniscal Tear

- Incidence increasing
  - Improved familiarity
  - Improved imaging, arthroscopy
- Mechanism and symptoms similar to adults
- Should attempt to fix

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Meniscus

- Meniscal Tears
  - Locking
  - Catching
  - Joint line pain
  - Repair vs. Debridement

- Discoid Meniscus
  - Complete
  - Incomplete
  - Hypermobile
  - Sauercation

Skeletal Immature ACL Tear

- Frequency increasing
- Sports
- 10-65% acute hemarthrosis
- Risk to further chondral and meniscal injury to knee
Skeletal Immature ACL Tears

- <12 Boys, <11 Girls Tanner 1-2
  - Extraphyseal reconstruction
  - Functional bracing

- 12-16 Boys, 12-14 Girls (Tanner 3-4)
  - Soft tissue graft, metaphyseal fixation

- >16 Boys, >14 Girls (Tanner 5)
  - Adult reconstruction of choice

Options
Modified Macintosh
Kocher, et al

Tibial Spine Fracture

- “Bony ACL”
- Dx
  - Nondisplaced
  - Hinged
  - Displaced

- Interposed medial meniscus
- Be prepared for meniscus tear
- Surgery
  - Fiberwire vs. Screw
**Tibial Tuberosity Fracture**

- Strong eccentric quad contraction
- Risk for compartment syndrome
- Fix urgently

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**Skeletal Immature PCL Injury**

- Rare
- Traumatic: Fall on flexed knee or knee hyperflexion
- Femoral origin peeloff
- Tibial insertion bony avulsion

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**Collateral Ligament Injury**

- Ligaments typically stronger than physis
- Isolated usually successfully treated with bracing and rehab

- **MCL**
  - Grade I-II
    - Crutches, hinged brace
    - 1-3 weeks
    - Return when full motion and asymptomatic
  - Grade III
    - Hinged brace 6 weeks then rehab if isolated

- **LCL**
  - Rare
  - Treatment similar to MCL
Osteochondral Fracture

- More common
- Typically associated with patellar dislocations or trauma
- Diagnosis can be challenging
- Treatment
- Excision vs. Fixation
- Cartilage restoration
Dislocations

- Patellar Dislocation
  - More common
  - Acute traumatic
  - Recurrent

- Knee Dislocation
  - Rare
  - High risk for neurovascular injury

Patellar Fractures

Patella Sleeve

Rare
Direct blow vs. Eccentric load
Patellar Sleeve
Assess straight leg raise

Osteochondritis Dissecans

- Unknown etiology
- Cause for joint pain
- Juvenile vs. “Adult”
- Treatment based on staging, maturity, and exhausting non-operative options
Bone Bruise

- Deep bone contusion/microtrauma
- Seen after direct trauma
  - Patellar dislocations
  - ACL tears
- Can take weeks to months for symptoms to abate
- Typically conservative treatment
  - Protected weight bearing
  - Ice/NSAIDS

Plica Syndrome

- Present in 1:3 knees
- In folding of normal knee synovial tissue
- May become symptomatic with direct trauma or overuse
- Conservative treatment
Things Not to Miss

SCFE  Infections/Tumors

Thank You

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