2017 Sports Medicine for the Primary Care Physician
Common Pediatric Sports Medicine Injuries

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Outline

- Background
- Cases & presentations of common pediatric sports medicine injuries
- Physical exam findings
- Imaging
- Treatment
- Prevention
Pediatric Sports Medicine

- Estimated that over 30-45 million children ages 6-18 participate in athletics annually

- Nearly ¾ of US households have at least one child that participates in organized sports

- Sports participation is more accessible with increased variety
  ◦ Increasing sports specialization
  ◦ More year round and concurrent sports

- Drive for success, college scholarships, going professional
  ◦ NCAA stats demonstrate that less than 0.5-1.6% of high school athletes will earn partial scholarships to D1 schools
  ◦ 1% of college athletes go professional
Pediatric Sports Medicine

- Over ½ of children under age 14 who seek medical care for injuries are due to overuse injuries
  ◦ Most common injuries
    ◦ Sprains, strains, bone or growth plate injuries, repetitive motion and overuse injuries, heat related illness
    ◦ 62% of injuries occur during practice

- Over 1 in 10 will have an emergency room visit for a sports related injury
Case #1
- 14 year old male with R knee pain x 1 year
- Pain is located over anterior knee
- Hurts more with running, jumping, squatting
- Front of knee seems swollen at the area of pain
Osgood Schlatter
(Tibial Tubercle Apophysitis)

- Cases & Common Presentations
  ◦ Ages 11-15 years old
  ◦ Males>females
  ◦ Occurs with running, jumping or increase in physical activity
  ◦ Worsens if hits/bangs/falls on tender area

- Physical exam
  ◦ Tenderness on palpation of tibial tubercle
  ◦ May have prominence/swollen appearance of tibial tubercle
Osgood Schlatter

- Imaging
  ◦ Xrays demonstrate an open tibial tubercle
  ◦ Xrays are not necessary
    ◦ Help to exclude tibial tubercle avulsion, cyst, tumor, infection

- Treatment
  ◦ Rest, activity modification
  ◦ Ice
  ◦ Patellar tendon strap
  ◦ Increase flexibility of hamstrings & quadriceps
  ◦ Closure of apophysis
Case #2

- 10 year old female with anterior knee pain x 2 weeks
- Pain occurs with running, kneeling, climbing
- Pain is located at inferior aspect of patella (superior to tender area in Osgood Schlatter)
Sinding Larsen Johanssen (Patellar Apophysitis)

- Cases & Common Presentations
  ◦ Ages 10-13 years old
  ◦ Pain present/worse with running, jumping, climbing, kneeling

- Physical Exam
  ◦ Tenderness over inferior pole of the patella

- Imaging
  ◦ Xrays not necessary
  ◦ May demonstrate irregular calcification at inferior pole of the patella
Sinding Larsen Johanssen (Patellar Apophysitis)

- Treatment
  ◦ Same as for Osgood Schlatter
  ◦ Rest/activity modification
  ◦ Ice
  ◦ Patellar tendon strap
  ◦ Flexibility of hamstrings & quadriceps
  ◦ Time to close growth plate

- Prevention?
  ◦ Good flexibility
  ◦ Gradual increase in activity
Case #3

- 16 year old female basketball player
- Twisting injury to knee resulting in a pop
- Could not walk or bear weight
- Immediate knee joint swelling
ACL Injury

- Physical Exam:
  - Limp
  - Effusion
  - May have TTP
  - Anterior drawer test
  - Lachman test
  - Higher sensitivity & specificity
ACL Imaging

- Obtain xrays
  - 4 views
    - AP and lateral
    - Notch or tunnel
    - Sunrise or Merchant

- MRI:
  - Any pediatric patient with effusion warrants MRI
ACL Treatment

- **Acute**
  - Ice, NSAIDs, crutches for pain management
  - Knee immobilizer
    - Only indications are patellar fracture, patellar dislocation, knee dislocation, ACL tear, quadricep or patellar tendon rupture, MCL rupture
  - Range of motion exercises
    - Heel slides, isometric quad contractions
  - Immediate referral to Sports Medicine/Ortho
- **Long-term is Controversial**
  - To fix or not to fix?
    - Increased risk of osteoarthritis to injured knee (5x) which may decrease (3x) with repair
Females & ACL Injury

• 4-6 time higher risk

• Anatomical and biomechanical differences:
  ◦ Smaller ligament & intercondylar notch
  ◦ Strong hamstrings, weaker quads

• Different mechanics with cutting, jumping & pivoting
  ◦ Land more upright with knees collapsing inward
Patellofemoral Pain

Medial Collateral Ligament

Meniscal Injury

Osgood-Schlatter's Lesion

Lateral Collateral Ligament

Fracture of the Patella

Sinding-Larsen-Johansson

Fat Pad Impingement

Patellar Tendinopathy
Case #3

- 8 year old male soccer player with bilateral heel pain
- Has been present for 2 years and is getting worse
- Occurs with activity and patient will limp at the end of the game
Sever’s Disease (Calcaneal Apophysitis)

- Cases & Common Presentations
  ◦ Ages 8-15
  ◦ Can be unilateral or bilateral
  ◦ Usually occurs after physical activity but as worsens will occur during physical activity and at rest
  ◦ May cause limping
  ◦ Most common in running and high impact activities
  ◦ Worse with cleats, flat feet
  ◦ Pain at insertion of Achilles tendon and plantar fascia
Sever’s Disease

- Physical Exam
  - Tenderness on palpation of medial & lateral aspect of calcaneus
  - + Calcaneal squeeze
  - May have tight calves, flat feet

- Imaging
  - Clinical diagnosis
  - Xrays demonstrate open physis
    - Often look irregular
Sever’s Disease

- Treatment
  ◦ Rest/activity modification
  ◦ Ice
  ◦ Heel cups
    ◦ Cushion, 3/8” heel lift
  ◦ Insert for arch support
    ◦ May build up back to lift heel
  ◦ Activity as tolerated, no limping allowed

- Prevention
  ◦ Achilles flexibility
  ◦ Arch support
Case #4

• 9 year old male football player with 2 months of lateral foot pain
• Causes him to limp while playing and afterward
• No specific injury
• No pain with walking
Iselin’s Disease

- Traction apophysitis at insertion of peroneal brevis at the base of 5th metatarsal
  - From repetitive inversion
- Exam:
  - Local tenderness
  - Pain with resisted eversion
- Tx:
  - Activity modification, stretching, progressive strengthening, ice, NSAIDs
  - Persistent: short legcast
Case #5

- 14 year old male football player who sprained his ankle during practice
- Wasn’t able to walk off the field
- Has bruising and swelling of ankle
- Pain with weightbearing
- Pain mainly located over lateral ankle and tenderness on palpation of distal fibula
Salter Harris 1 Fracture of Distal Fibula

- Cases & Common Presentations
  ◦ Usually inversion ankle injury
  ◦ Swelling
  ◦ May have pain with weightbearing
  ◦ Ankle injury in skeletally immature patient
    ◦ Most occur ages 8-15 years old
    ◦ Physis is the weakest link
  ◦ Often missed and treated as ankle sprain

- Physical Exam
  ◦ Tenderness on palpation of distal fibular physis (1cm above distal tip of the fibula)
Salter Harris 1 Fracture of Distal Fibula

- Imaging
  ◦ Obtain WEIGHTBEARING ankle x-rays (AP, lateral, and mortise views)
  ◦ X-rays often normal
    ◦ May demonstrate soft tissue swelling or widening of physis
    ◦ Still treat for a SH 1 fracture if x-rays normal

- Treatment
  ◦ Tall walking boot & weightbearing as tolerated (use crutches if still has pain while in the boot)
  ◦ Repeat exam in 3-4 weeks
  ◦ Refer displaced fractures to ortho
Case #6

- 16 year old male soccer player was kicking a soccer ball
- Felt and heard a pop from his hip
- Fell to the ground and had difficulty bearing weight
- Has bruising and swelling of his hip
- Tenderness on palpation of anterior hip
- Decreased strength & flexibility
Hip Avulsion

- Cases & Common Presentations
  ◦ Mechanism of injury is sudden forceful contraction of muscle
  ◦ Kicking, sprinting, jumping
  ◦ Most common at ASIS, AIIS, ischial tuberosity
  ◦ Also can occur at iliac crest, lesser trochanter, pubic symphysis
  ◦ Usually occurs between ages 14-18 years old
Hip Avulsion

- Muscle attachments and mechanisms of injury
  - ASIS (Sartorius) & AIIS (Rectus femoris)
    - Kicking, coming out of starting blocks
  - Lesser trochanter (iliopsoas)
    - Sprinting, hip flexion
  - Ischial tuberosity (hamstring)
    - Hurdles, splits, high kick
  - Iliac crest (abdominal muscles)
    - Abrupt trunk rotation
    - Change of direction with running
Hip Avulsion

- Physical Exam
  ◦ May have bruising & swelling
  ◦ Tenderness on palpation over a growth plate
  ◦ Pain with motion and manual resisted testing
  ◦ Antalgic gait

- Imaging
  ◦ Xray AP pelvis & frogleg lateral

- Treatment
  ◦ If > 2cm displacement refer to ortho
  ◦ Acute: rest, crutches, ice, analgesics
  ◦ Subacute: Physical therapy-> ROM, stretching, strengthening, then gradually guide back activities
Hip Apophysitis

- Common Presentations
  ◦ Gradual onset pain of pelvis/hip without specific trauma
  ◦ Due to chronic traction at growth plate where tendon inserts
  ◦ Skeletally immature

- Physical Exam
  ◦ Tenderness on palpation at site of tendon insertion

- Imaging
  ◦ Xray AP pelvis & frogleg lateral often normal

- Treatment
  Rest x 4 weeks, physical therapy, gradual return to play
Case #7

- 12 year old right hand dominant baseball pitcher has 2 weeks of right shoulder pain
- Hurts when throwing, particularly if trying to throw hard
- Has been icing and taking ibuprofen but pain is still present
- Had pain at the end of last season that went away when the season finished
Little League Shoulder (Humeral Epiphysitis)

- Common Presentations
  ◦ Ages 11-16 years old
  ◦ Mechanism of injury: Repetitive torsional stress

- Physical Exam
  ◦ Tenderness over proximal humerus
  ◦ Usually will have positive impingement signs

- Imaging
  ◦ Xray Shoulder (AP, axillary, scapular Y views) may show widening of the proximal humeral epiphysis

Treatment:

Rest & Rehabilitation: Usually 3 or more months
Gradual return to throwing program
Case #8

- 12 year old right hand dominant baseball catcher with right elbow pain
- 2 months of elbow pain that is getting worse
- Initially was a pitcher but stopped due to pain and now catching but continues to have pain
Little League Elbow (Medial Condyle Apophysitis)

- Common Presentations
  ◦ 8-15 years old
  ◦ Usually no trauma
  ◦ May complain of weak & ineffective throws
  ◦ Most common in pitchers, followed by catchers, 3rd base, SS, outfield
  ◦ Mechanism of injury= repetitive valgus stress on elbow from overhead throwing

- Physical Exam
  ◦ Tenderness over medial epicondyle
  ◦ Pain with resisted wrist flexion & forearm pronation
Little League Elbow

- Imaging
  ◦ Bilateral Elbow xrays (AP, lateral & oblique views)
  ◦ May see widening of physis

- Treatment
  ◦ Rest, ice, NSAIDs, immobilization (rarely)
  ◦ Physical therapy: ROM, strength (elbow, shoulder, trunk, lower extremity)
Upper Extremity Injury Prevention

- Prevention
  ◦ Preseason strengthening and graded return to throwing program at least 6-8 weeks prior to 1st practice
  ◦ Focus on scapular stabilizing, rotator cuff, hip, trunk, & lower extremity strengthening
  ◦ Address deficits in the off season
  ◦ Rest from overhead throwing at least 3 months out of the year
  ◦ Follow pitch counts & rest days
    ◦ Monitor all teams
  ◦ Proper mechanics
    ◦ Close attention to technique & monitored by coaches
    ◦ No high velocity (>80mph), curve balls or sliders until skeletally mature (~14 years old)
  ◦ Stop if having pain & get evaluated promptly
Case #9

- 15 year old gymnast with right sided low back pain
- Bothers her with bending forward but worsens with backward bending
- Improves with rest
Spondylolysis
(Stress fracture of pars interarticularis)

- Common presentation
  ◦ Athletes with repetitive extension or rotation of spine
    ◦ Gymnasts, dancers, figure skating, football linemen, rowing
  ◦ Risk factors are family history and spina bifida
  ◦ Most common at L5 followed by L4
    ◦ May be seen in higher lumbar vertebrae but much less frequent

- Physical Exam
  ◦ Midline tenderness
  ◦ Pain with lumbar extension
  ◦ Positive stork test
  ◦ Tight hamstrings
Spondylolysis

- Imaging
  ◦ Xrays AP and lateral lumbar spine
    ◦ No obliques
  ◦ MRI/CT lumbar spine
    ◦ Determine what is best at your facility & be sure to talk with radiology
Spondylolysis

- Treatment
  - Rest
    - Bracing controversial
  - Physical therapy
    - Avoid extension
    - Core strength, lower extremity flexibility

- Complications
  - Spondylololithesis: subluxation of upper vertebrae of lower vertebrae at site of bilateral spondylolysis
  - Chronic low back pain
  - Neurologic symptoms
  - Surgery for worsening spondylololithesis and chronic symptoms
What can we do to prevent injury?
AAP Recommendations 2007

- Recommend 1-2 days off per week of sport specific training
- Recommend 2-3 months off of specific sport per year
- Weekly training should not increase more than 10% per week
- Encourage one team per season
- Focus on fun, building skills, sportsmanship, safety
AMSSM Recommendations
2014

- Overuse injuries are often underreported
- Prior injury is a predictor of future injury
- Females should be evaluated for menstrual abnormalities
- Parents & coaches should be educated on sports readiness & goals should be set accordingly
- Early specialization may not lead to long-term success
- Sport diversification should be encouraged due to overuse injuries & burnout
References


- O’Connor et al, eds. ACSM’s Sports Medicine: A Comprehensive Review. Lippincott Williams & Wilkins; 2013


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Thank You

Questions?