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COMMON PEDIATRIC SPORTS MEDICINE INJURIES

OUTLINE

- BACKGROUND
- SPECIALIZATION PHENOMENON
- 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
WHAT IS SPORT SPECIALIZATION?

• ASPECTS OF TYPICAL DEFINITION
  • HIGH VOLUME AND INTENSITY OF TRAINING
  • DURATION OF TRAINING AT A YOUNG AGE
  • MINIMAL REST OR TIME OFF
  • STRUCTURED TRAINING WITH EMPHASIS ON PHYSICAL DEVELOPMENT
  • EXCLUSION OF OTHER SPORTS
• GOAL IS TO OPTIMIZE OPPORTUNITIES TO DEVELOP ATHLETIC SKILLS IN 1 SPORT TO ENHANCE CHANCE OF COMPETING AT THE NEXT LEVEL

THEORY OF SPORT SPECIALIZATION

• BASED ON INTERPRETATION OF A STUDY BY ERICSSON FROM 1993
• DANIEL COYLE; THE TALENT CODE
  • GREATNESS ISN’T BORN. IT’S GROWN.
  • HIGH VOLUMES OF DELIBERATE PRACTICE AT A YOUNG AGE WAS THE STRONGEST PREDICTOR OF BECOMING AN EXPERT PERFORMER
• LED TO THE “10,000 HOUR RULE”
• EXPERT STATUS FOR MUSICIANS, MATHEMATICIANS, AND CHESS PLAYERS NOT ATHLETES
• NO SPECIFIC NUMBER OF HOURS WAS PROVEN AS ENOUGH TO MASTER A TASK.
STRESS FRACTURE

- Diagnosis
- Pain on exertion
- Tenderness on palpation
- Imaging

OSTEOCHONDROMATOSIS DISSECSANS

- Occurs in young people whose growth plates haven’t yet closed
- Loosening of the bone and overlying cartilage
- Most commonly affects the knees, hips, elbows, and ankles
OSTEOCHONDROSIS DISSECTANS

• Diagnosis
  - Symptoms may include a joint that "locks" or "gets stuck"
  - X-rays may show small pieces of bone that have separated

• Treatment
  - Conservative treatment at 1st
  - Long period of rest
    - May require casting or bracing
  - Surgery may be necessary

CASE #1

• 14 year old male with L 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**
  - X-rays demonstrate an open tibial tubercle
  - X-rays 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 JOHANSSSEN (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 JOHANSSSEN (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

- 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

- 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 XRAYS** (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

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CASE #5

- 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 (LIOPSOAS)
    - Sprinting, hip flexion
  - ISCHIAL TUBEROUSITY (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 test
  - Antalgic gait

- Imaging
  - X-ray 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 APHYSISIS

- 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
  - X-ray AP pelvis & frogleg lateral often normal

- Treatment
  - Rest x 4 weeks, physical therapy, gradual return to play
CASE #6

- 12 YEAR OLD LEFT HAND DOMINANT BASEBALL PITCHER HAS 2 WEEKS OF LEFT 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 #7

- 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 x-rays (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
HTTPS://WWW.LITTLELEAGUE.ORG/PARTNERSHIPS/PITCH-SMART/

http://m.mlb.com/pitchsmart/
CASE #8

- 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**
  • Spondylolisthesis: subluxation of upper vertebrae of lower vertebrae at site of bilateral spondylolysis
  • Chronic low back pain
  • Neurologic symptoms
  • Surgery for worsening spondylolisthesis and chronic symptoms
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THANK YOU

• Questions?