Sports Medicine Cases

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Objectives

At the conclusion of this session participants should be able to:

- Describe the various types of conditions associated with sports injuries in adolescents
- Distinguish between acute and overuse injuries in adolescents
- Differentiate between many causes of difficulty breathing with exercise
- Develop an approach to evaluating and managing sports medicine injuries in adolescents
Pediatric Skeleton

- Bone is relatively elastic and rubbery
- Periosteum is quite thick & active
- Ligaments are strong relative to the bone
- Presence of the physis - “weak link”
- Ligament injuries & dislocations are rare – “kids don’t sprain stuff”
- Fractures heal quickly and have the capacity to remodel
Injury (Acute) vs. Pain (Chronic)

- Fracture**
- Dislocation
- Sprain
- Strain

- Apophysitis**
- Tendonitis
- Stress Fractures
Cases – Diagnosis and Management

- Shoulder
- Wrist
- Neck
- Back
- Hip
- Knee
- Ankle
- Shortness of breath
Hockey Player with shoulder injury

- 18yo playing hockey and checked into the boards striking his right shoulder
- Did not feel a pop and did not feel like it come out of place
- Difficulty raising his arm since
- No previous injury
- Tournament this weekend
Exam

- Swelling over the right shoulder
- Clavicle looks high riding
- Pain with palpation of the AC joint but not the clavicle
- Pain with cross body adduction
- Decreased abduction with pain
- Negative Apprehension test
- 4/5 strength of the rotator cuff with pain
Differential Diagnosis

- Clavicle fracture
- Shoulder dislocation
- AC joint sprain
- Acromion fracture
- Contusion
Grade II AC Joint Sprain

- Ice, Ibuprofen
- Sling for comfort
- Rest from contact
- Avoid bench & military press as well as pushups
- OK to play when full motion and strength in an AC pad
Football Player with wrist injury

- 16yo football player fell on an outstretched left wrist 1 week ago and has continued pain with wrist extension
- Unable to lift weights because of pain
- Using ice, Ibuprofen, ACE bandage
- No previous wrist injury
- No previous fractures
Exam

- No swelling, deformity, or bruising
- Decreased wrist flexion or extension
- Pain with passive wrist extension
- Tender to palpation on the navicular bone in the anatomic snuff box
- Negative axial load test
- NV intact
Differential Diagnosis?

- Wrist Sprain
- Fracture Navicular
- Bone bruise Navicular
- Triangular Fibrocartilage
- Gymnast’s Wrist
Gymmnast’s Wrist

- Distal Radial Epiphysis Closure
- Repetitive compressive loading of radial physis which leads to premature closing
- Continued growth of the ulna – positive ulnar variance
- Compression of thin TFCC between ulna and triquetrum, may lead to tear of TFCC
Treatment

- Avoidance of weight bearing on upper extremities when painful (tumbling, vault, etc.)
- Parallel bars, rings, some balance beam OK
- Ice, NSAIDS, Tylenol
- May require surgery once ulnar deviation is present and painful with prolonged rest
Case 1 – Initial Xray Navicular View (Ulnar Deviation)
Presumed Navicular Fracture

Treatment
- Short Arm Spica Cast
- Tylenol prn
- Vitamin D/ Calcium
- Elevation

Return to football with
Follow-up?
Case 1 – Xray Week 2
Case 1 – Xray 3mths Nonunion
The Perfect Fracture

- Very Common Injury
- Difficult to detect on xray initially
- High Complication Rate – Nonunion
Navicular Fracture

- High index of suspicion
- Treat in a thumb spica splint
- Refer to ortho
16yo Football Player with Neck Injury

- Cornerback makes a tackle with his head down
- Other players get up and he does not
- Complains of neck pain
- Is able to move his fingers and toes
- Denies parathesias
- Wants to return to the game
High Risk Sports

- Football
- Gymnastics
- Wrestling
- Soccer
- Ice Hockey
- Equestrian
- Skiing / Snowboarding
- Swimming and Diving
Case continued

- Packaged and transported to the ER
- 3 view c-spine series
- Compression fracture of C7
- Aspen collar for 4 weeks followed by PT x 4 weeks
Clearing the C-spine: NEXUS Criteria

- N – Normal neuro exam
- S – (No) Spinal Tenderness (midline)
- A – Awake and alert
- I – (No) Intoxication
- D – (No) Distracting Injury
15yo Gymnast with back pain

- Low back pain for 4 weeks
- Pain with activity
- Was told she had scoliosis by her coach
- Level 6 gymnast
- No injury
- State competition in 1 month
Exam

- No deformity/ swelling
- Full range of motion
- Pain with single leg extension bilaterally
- Tenderness to palpation over the L5 spinous process not muscles
- Negative straight leg raise
- Normal hamstring flexibility
- NV intact
- Normal gait
Differential Diagnosis - Adolescent

- Scoliosis
- Muscle Strain
- Spondylolysis
- Spondylolisthesis
- Disc herniation
- Vertebral Endplate Injury
Stress Fracture of the Spine

Spondylolysis:
- bony defect in pars interarticularis

Spondylolisthesis:
- one vertebral body slips in relation to the one below secondary to bilateral spondylolysis
Stress Fracture of the Spine

- Overall Incidence: 4 - 6%, most are asymptomatic unless repetitive stress across posterior elements of lumbar spine
- Incidence in active adolescents: 50%
- Mean age of diagnosis: 15 - 16 years during growth spurt
- 85% occur in pars interarticularis of L5 vertebral level
- Caused by repetitive extension – dancing, gymnastics, football, weight lifting
Imaging

- **Radiographs:**
  - Obliques: defect in pars – collar on the Scotty dog
  - Lateral with Flexion/Extension: fracture visible if bilateral, forward translation of vertebral body

- **MRI:** sensitive and specific if correct sequences

- **Bone scan with SPECT:** useful in determining if active

- **CT scan:** useful in assessing healing
Spondylolysis
Management of symptomatic pars defects is controversial!

PT - strengthen back, abdominal musculature while stretching hamstrings, avoid extension!

Restriction of activities if painful

Antilordosis brace 23 hours a day for 6 months?
Baseball player with hip pain

- 14yo c/o right anterior hip pain for 1 week
- Pain worse with activity
- No injury
- Limp
- No previous
- No other joint swelling
- No treatment
Exam

- No deformity or swelling
- Tenderness to palpation AIIS
- Pain and limited hip flexion and extension
- 4/5 strength and pain with flexion
- Negative log roll
- Positive Trendelenberg
- Antalgic gait
Differential Diagnosis

- Slipped Capital Femoral Epiphysis
- Legg-Calve-Perthes Disease
- Hip Dysplasia
- Pelvic/ Hip Apophysitis
Slipped Capital Femoral Epiphysis

- Displacement of the femoral epiphysis from the femoral neck through the physis (Salter-Harris I)
- 1-3/100,000
- Mean age – girls (11yo)/ boys (13yo)
- Bilateral 20-40%
- Stable
- Unstable
SCFE - Risk Factors

- Obesity - present in >50%
- Male gender
- African American
- Previous SCFE - 36%
- Peak Height Velocity
- Endocrine Disorders – GH Deficiency, Hypo/hyperthyroidism, MEN, Panhypopituitarism, Renal Disease
SCFE - Exam

- Tenderness over anterior joint
- Hip may be held in ER
- Restricted motion – IR, abduction, flexion
- **Whitman’s sign** – as the hip is flexed it will ER and abduct
- Leg Length Discrepancy in chronic cases
SCFE - Xrays

- Pelvis - AP/ Frogleg lateral views not hip films!
- Displacement of the femoral epiphysis posteriorly and downward
- Widened physis alone
- Klein’s Line – line drawn along the superior aspect of the femoral neck should intersect with the epiphysis
Frogleg Lateral/ AP Views
Pelvic Apophysitis

- Insidious onset of hip pain or sudden sharp pain with running, jumping, kicking
- Point tender
- Pain with stretch or contraction of involved muscle
- Widening of physis
HIP/PELVIS Apophyses

- ASIS – Sartorius
- Iliac Crest – ITB, Tensor Fascia Latae
- AIIS - Rectus Femoris
- Ischium - Adductor Longus/ Hamstrings
- Greater Trochanter – Gluteus Medius
- Lesser Trochanter - Iliopsoas
AIIS - Rectus Femoris
Soccer player with knee injury

- 16yo female soccer player injured left knee running and cutting to the right
- Felt a pop
- Significant Swelling
- Treating with ice, Ibuprofen and ACE bandage
- No previous knee problems
- Game in 2 weeks
Exam

- Obvious swelling
- Antalgic gait
- Difficulty with full extension, flexion to 90 degrees
- 5-/5 strength with both flexion and extension
- **Effusion**
  - Positive Lachman; Negative Varus/ Valgus stress and Posterior Drawer
  - Tenderness to palpation over the MCL and the lateral joint line
- Negative Patellar Apprehension Test
Effusion Exam
Laxity Knee

- Supine – Flexion 30/0 degrees
  - MCL - Valgus Stress
  - LCL – Varus Stress
  - ACL
    - Lachman, Modified
  - PCL
    - posterior drawer (90 degrees)
Differential Diagnosis?

- ACL/ PCL Tear
- Meniscus Tear
- Patellar Dislocation/ Subluxation
- Fracture
- Bone Bruise
ACL Tear

- Ice, IB, Compression
- OK to weight bear
- Range of motion, quad strength
- No sports
- ? joint aspiration
- Refer to Ortho/ MRI
Patellar Dislocation

- Indirect injury more common
  - Quad contraction combined w/ rotation
  - Flexed, valgus knee
  - Reduces with knee extension

- Direct blow less common
Radiographs

- AP, Lateral, Merchant or sunrise
  - Femoral or patellar fracture
  - Underestimate articular surface lesions
  - Identify <50% of osteochondral loose bodies
Patellar Subluxation

Treatment
- Ice, Ibuprofen
- Rest
- Short term immobilization
- PTO (patellar tracking orthosis) brace
- Physical Therapy – quadraceps strengthening “boss of the knee”

Return to Soccer?
Basketball Player with ankle injury

- 14yo male basketball player inverted his right ankle while playing 4 days ago
- Felt a pop and had immediate swelling laterally
- Not weight bearing
- Treated with ice, Ibuprofen, ACE bandage and rest
- 2 Previous sprains in past
- Game this weekend
Exam

- Significant swelling and bruising laterally extending to the dorsum of the foot
- Decreased plantarflexion
- Tender to palpation on distal fibular physis more than the lateral ligaments
- Pain with ankle inversion not external rotation stress
- Antalgic gait
- 5/5 strength x 4
- AP/ Lateral/ Oblique Xrays Normal
Differential Diagnosis

- Lateral Ankle Sprain
- Salter Harris I Distal Fibular Physis
- 5<sup>th</sup> Metatarsal Avulsion
- Midfoot Sprain
- Talar Dome Osteochondritis Dessicans
- Tarsal Coalition
SH I Distal Fibula

- Boot vs. Brace
- Weight-bearing as tolerated
- Ice
- Tylenol or IB
- ROM
Soccer player with heel pain

- 12 year old soccer player with heel pain when she runs
- Tried inserts, ice, IB
- Also runs track for school
- Tender over the posterior calcaneus not achilles
- Tight heel cord
Calcaneal Apophysitis (Severs)

- Overuse injury
- Tension injury to the calcaneal apophysis
- X-rays not diagnostic but show the open apophysis (often multi-partite)
Sever’s Disease

Treatment

- Heel cord stretching
- Ice, Ibuprofen
- Heel cups
- Rest if painful
- Modify Activity – 1 sport
- 1 case in literature of acute avulsion
Runner with Collapse

- At high school 5k cross-country meet
- 17yo crosses finish line and collapses
- Has history of previous episodes diagnosed as EIA
- High school athletic trainer furiously administering albuterol by MDI every 10sec without improvement
- You are called to her side
Exam

- Flushed, awake, look of fear in the eyes, unable to talk, limp
- Normal vitals expect elevated RR
- Tachypneic, retracting, *inspiratory stridor*, no expiratory wheeze
Differential Diagnosis?

- Exercise Induced Asthma
- Vocal Cord Dysfunction
- Foreign Body Aspiration
- Hyperventilation Syndrome
- GE Reflux
- Exercise induced anaphylaxis
- Tracheobronchitis
- Pneumothorax
Foreign Body Aspiration

- Mouthpiece
- Gum
- Rocks
- Tobacco
Case (cont’d)

- **Treatment**
  - Shade, Fans, Privacy
  - Reassured that nothing bad was going to happen
  - Instructed to breathe in through her nose and make the “S” sound with exhalation

- Return to the next race?
Vocal Cord Dysfunction

Psychogenic paradoxical closure of the vocal cords with inspiration

Symptoms progress rapidly and do not respond to B-agonist

50-60% of VCD patients also have asthma
VCD - Symptoms

- Respiratory Distress
- Inspiratory Wheezing
- Exertional Dyspnea
- Stridor
- Hyperventilation
- Throat Tightness
- Anxiety
Diagnosis –
- PFT’s - Flattening/ truncation inspiratory limb of flow loop (only present in 20%)
- Direct visualization via flexible laryngoscopy**
Vocal Cords

- Open
- Closed
VCD - Treatment

- Acute –
  - Quiet, cool environment
  - Talk down
  - Bag breathing
  - Saline/ Epinephrine neb
  - Don’t Intubate!

- Speech Therapy
- Psychotherapy
Take Home Points

- Fractures are more common in adolescents
- High index of suspicion for the “jammed finger”, Navicular fractures, ACL tears, spondylolysis.
- Look for occult, subtle or stress fractures.
- Get an x-ray.
- Read the x-ray.
Thanks!