Pediatric Seminar:
Primary Care
Office Emergencies

November 4-5, 2023

The Limping Child and Various Other Orthopedic Complaints

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Experts in pediatrics,
Advocates for children.

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Disclosures

- I have no disclosures.

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Objectives

1. Discuss the potential causes of the child with a limp.
2. Describe the history and physical exam of the child with a limp.
3. Be able to identify the appropriate diagnostic work-up.
4. Brief Review of other orthopedics complaints and their management

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Definition of Limp

- "A pathologic alteration of smooth, regular gait, in which weight bearing on the painful (or weaker) limb is minimized" (Teach, 1998)

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Gait

- Involves CNS, spinal cord, peripheral motor and sensory nerves, and skeletal muscles.
- Normal gait cycle
  - A weight-bearing phase (stance)
    - Time from the heel striking the ground to the toe leaving the ground
    - 60% of gait
  - A Non-weight-bearing phase (swing)
    - Hip then knee flexion
    - Followed by foot dorsiflexion and knee extension as the heel strikes the ground

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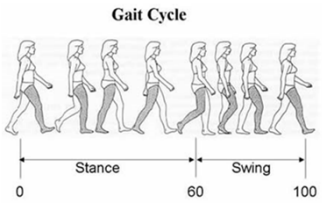

me.queensu.ca/people/deluzio/images/GaitCycle.jpg

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Types of Gaits

- Antalgic gait-designed to decrease or minimize pain in the affected body part.
- Trendelenburg gait-slump of the pelvis during non weight bearing phase of gait on the side opposite a weak or painful hip.
- Steppage gait-weak ankle dorsiflexion
- Vaulting gait-limb length discrepancy or abnormal knee mobility
- Stooped or shuffle gait-pelvic or lower abdominal pain

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Etiologies

- Trauma (soft tissue injury, fracture, dislocation, sprain, foreign body)
- Infectious (osteomyelitis, septic arthritis, Lyme disease, Intervertebral diskitis, viral illness)
- Hip diseases (Transient synovitis, Legg-calve' perthes disease, SCFE)
- Knee diseases (Osgood-Schlatter disease, Painful patella syndrome, Osteochondritis)
- Other causes (HSP, IBD, Serum sickness, Acute Rheumatic Fever, SLE, Sickle cell disease, Neoplasms-osteogenic or Ewing's sarcoma)

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Key history questions

- How long and when did the limp begin?
- How does it affect the child's normal activities?
- Any history of trauma?
- Is the child wearing new of poorly fitting shoes?
- Any associated symptoms such as fever, weight loss , anorexia, back pain, arthralgia, voiding or stooling problems.
- If there is presence of pain, ask where, when does the pain occur and how severe is the pain.

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Focused History

- Recent trauma
- Onset of limp (acute or chronic)
- Presence and location of pain
- Recent illnesses
- Associated symptoms (fever or rash)

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History in Limp

- Fever, weight loss, anorexia
- History of trauma
- Activity increases pain
- Activity decreases pain
- Recent viral illness or antibiotic use
- Cyclic pattern, nocturnal
- Morning stiffness
- New or increased sport activity
- Intramuscular injection vaccination
- New or poorly fitting shoes
- Psychosocial problems
- Family history of connective tissue disorders
- Migratory arthralgia
- Back Pain
- Endocrinopathies

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Physical Exam

- Strength, reflexes and sensation
- Palpation of joints and muscles
  - ROJM
  - Size, strength, and sensation of both extremities
  - Evaluation of hips for pain
- Signs and symptoms of inflammation (erythema, edema, warmth)
- Evaluate the hips for pain
  - Flexion and extension
- Evaluation of lower extremities, nervous system, abdomen, and GU

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Differential diagnosis

- Limp by location
  - Osseous
  - Soft tissue
  - Articular
  - Neurological
  - Intraabdominal

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Differential Diagnosis

- By age
  - Toddler/Preschool
  - School-age
  - Adolescent
- By gait abnormality
  - Antalgic
  - Trendelenburg
  - Steppage
  - Toe-walking
  - Vaulting Gait

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Differential Diagnosis

- Life or limb threatening limps
  - Septic Arthritis
  - Osteomyelitis
  - Tumor
  - Torsion of testicle
  - SCFE
  - Fracture
  - Appendicitis
  - Epidural Abscess

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Diagnostics

- Radiographs to exclude fractures, avulsions, dislocation, and tumors
  - Consider AP and Frog leg bilateral views of the pelvis
  - May need comparison views of unaffected side
- Ultrasounds to rule out joint effusion
- Bone scans for occult fracture, infection, avascular necrosis, and tumor.
- Laboratory testing
  - CBC
  - ESR, CRP
  - Blood cultures
  - Gram stain of aspirated fluids

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Follow up

- Follow up with PMD or return to the ED if:
  - The child cannot walk
  - A high fever is present
- Referral to specialist as indicated.
- Should be followed every few days if initial work-up is negative.
- If limp persist for 1-2 weeks referral to specialist is indicated

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Specifics Diagnosis

- Transient or toxic synovitis
- Septic arthritis
- Osteomyelitis
- Toddlers Fractures
- Stress fractures
- SCFE
- Legg Calve' Perthes Disease

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Transient (toxic) synovitis

- Most common non-traumatic hip pain.
- Affecting up to 3% of the pediatric population
- Post infectious reactive arthritis
- Usually follows a viral respiratory or GI illness
- Pain and limitation of motion in the hip
- Occasionally the knee or ankle
- Resolve gradually
- Conservative therapy
- Ages 3-10 most typical, (Peak is age 6)
- Absent or low-grade fever
- Non-toxic appearance
- Antalgic gait
- Prefer to keep hip abducted and externally rotated

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Treatment of TS

- NSAIDS
- Rest and return to activity as tolerated
- Diagnosis is made after all other possibilities are ruled out.

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Septic Arthritis (septic joint)

- Bacteria invades the synovial space
- Can be difficult to diagnose
- Serious condition
- May occur when a child has osteomyelitis as well
- Most common joint is hip in neonates and infants; knee in older children.
- Most common organism: Staphylococcus aureus, Group B beta hemolytic streptococcus, and H-influenza.

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How does bacteria get into the joint?

- Traumatic or surgical infection
- Local invasion of the bone from adjacent infected structures
- Hematogenous infection: blood to bone

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History

- Rapid onset of severe joint pain within 24-48 hours
- Irritability
- Refusal to use the extremity or bear weight
- Fever
- Malaise
- Possible recent URI or local soft tissue infection
- Poor feeding in the infant

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Physical Exam/diagnostic

- Swollen hot joint
- Severe Pain with joint range of motion
- Abducted and externally rotated hip position or slight flexion for comfort
- WBC are helpful but can be normal
- ESR- most sensitive test
- CRP is the newer test
- Definitive diagnosis- synovial fluid exam by orthopedic physician.

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Kocher Criteria

- Fever
- Elevated WBC (>12,000)
- Elevated ESR >40
- Inability to bear weight

- 0 – <0.2%
- 1 – 3%
- 2 – 40%
- 3 – 93.1%
- 4 – 99.6%

- Kocher et al. (1999)

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Limping due to Trauma

- Toddlers Fracture
  - Ages 9-36 months
  - Involve distal 1/3 of tibia
  - Trivial mechanism (falling from a height, tripping, twisting of ankle
  - Childhood Accidental Spiral Trauma (CAST)
    - Distal half of tibia
    - Subset of toddlers fractures
    - Mean age is 50.7 months

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How is the diagnosis made?

- Refusal to bear weight
- PE findings are subtle
- Bruising and deformity are absent
- Local tenderness, swelling or warmth may be present
- Pain on dorsiflexion of the ankle
- Radiograph will show a faint lucent oblique line crossing the distal tibia.
- Consider child abuse if the fracture is midshaft
- Treatment is long leg posterior splint with foot in neutral position then cast for 5-6 weeks (pad heel)

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Osteomyelitis

- Defined as inflammation and infection of the bone
  - Hematogenous
  - Direct spread
  - Penetrating wound
- Bacteria enter at level of the metaphysis
- Neonates and young infants can get Septic arthritis and osteomyelitis
- Most common in ages 3-12
- Boys affected more than girls

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Osteomyelitis: Clinical Findings

- Fever and Pain are highly sensitive findings-not always present
- Erythema and swelling are less common
  - If present usually more advance periosteal involvement
- Irritability of neonates and young infants
- Older children can localize site of pain
- Pain usually noted (limp, non-weight bearing or decreased ROJM of the limb

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Diagnostics

- Blood culture
- Bone aspirates
- WBC- elevated in only 1/3 of the cases
- ESR and CRP are elevated in >90%
- Plain X-ray
  - Negative radiograph in first 10 days does not rule out osteomyelitis
- Bone scan-if high suspicion and negative X-ray

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Management of osteomyelitis

- IV antibiotics
  - Based on predominant organism by age group
  - Mechanism of infection
  - Gram stain results
- Staphylococcus aureus is the most common
- Special considerations for sickle cell patient and penetrating wounds

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Slipped Capital Femoral Epiphysis (SCFE)

- Bony deformity
- Femoral epiphysis slips posteriorly
- Impaired internal rotation of the hip
- Limping results
- Acute hip pain
- Inability to walk
- After minor trauma
- More commonly
  - Months of hip or knee pain
  - Antalgic or Trendelenburg limp
  - With or without an acute exacerbation
  - Increased with physical activity
  - Chronic or intermittent
- Obese, inactive males ages 13-15
- Rapidly growing tall, thin youths ages 10-16
- Etiology unknown

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Important considerations

- Gradual or acute onset of groin, thigh or knee pain
- Inability to bear weight
- Diagnosis based on physical exam and X-rays
- Immediate treatment necessary
- Orthopedic referral
- Non weight bearing
- Possible surgical intervention with pinning
- Can occur on both sides
- Children with endocrine disorders have a higher incidence of bilateral involvement

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Legg Calve-Perthes Disease

- Avascular necrosis of the femoral head
- Ages 3-12, peak ages 5-7
- Boys 4:1
- Rare in African-Americans
- Unknown etiology
- Possible interruption in blood supply
- Trendelenburg gait

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Presentation

- Painless limp
- Occurs intermittently after activity
- Limp becomes more consistent and may be associated with hip, groin, thigh, or knee pain (commonly at the end of the day)
- ADHD common in children with disease
- Septic arthritis and osteomyelitis must be ruled out
- Orthopedic consult after diagnosis

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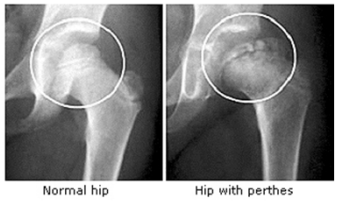

Normal hip Hip with perthes

www.cssd.us/images/medicalinfo/perthes3.jpg

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Foot fractures

- Calcaneus or cuboid bone most common
- Can be very subtle
- May only be seen on bone scan
- If a child has a persistent limp after trauma with negative radiographs, follow up radiographs or bone scan should be considered
- Clinical significance is not known because to tend to heal without and problems

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Stress fractures

- Repetitive loading cause fatigue, continued stress and eventual fracture
- Bone remodeling
- Consider in children who have history of new or increased sport activity
- Pain with activity, resolves with rest
- MRI is the preferred test if radiograph is negative and diagnosis is necessary
- Referral to orthopedic surgeon
- Treatment varies upon site
  - Rest
  - Follow up and education to prevent re-injury
  - Casting or surgery may also be necessary

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Conclusion

- Limping is never normal
- Be knowledgeable about diagnosis and management of limping
- Thorough history and physical
- Using age-based approach is helpful
- Know appropriate images and laboratory testing
- Timely diagnosis results in more optimal outcome.

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Miscellaneous Pediatric Orthopedic Emergencies

Experts in pediatrics, **Advocates for children.**

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Epidemiology of Orthopedic injuries

- 10-25% of childhood injuries are related to musculoskeletal trauma
- 10-15% of emergency department visits, in urban pediatric hospitals, are related to musculoskeletal trauma
- This number is on the rise because of the rapid growth of organized sports
- There are many anatomical and physiological differences between pediatric and adult bones
- Many pediatric orthopedic injuries are quite different than adult orthopedic injuries

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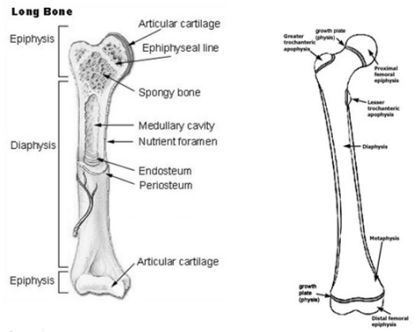

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Common Etiologies of Musculoskeletal Emergencies in Children

- **Organized Sports**
  - Football, Soccer, Baseball, Basketball, Volleyball, Gymnastics, etc.
- **High Speed Sports/Activities**
  - Skateboarding, Skiing, Roller Skating, biking, ATVs, etc.
- **Play equipment**
  - Monkey bars, Trampolines, Water parks/Swimming pools
- **Falls**
- **MVCs/MVC vs. pedestrian/bicycle**
- **Crush injuries (animal bites, machinery, etc.)**
- **Obesity**
- **Child Abuse**

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Fractures

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Fractures

- **Assessment**
  - **History**
    - Location of Injury
    - Mechanism
    - Direction of forces
    - Timing/onset
    - Witnesses
    - Use of protective equipment
    - Pain
    - Disability
    - Deformity
    - Open wounds
    - Neurovascular function
    - Motor Strength
    - Aggravating/relieving factors
    - Pre-hospital interventions
    - Pertinent medical/surgical history

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Fractures

- **Assessment**
  - **Physical**
    - ABCs (CAB)
    - **Focused injury assessment**
      - Include joints/structures above & below injury
      - Compare to unaffected side
      - Skin color & temperature & integrity
      - Pulses /cap refill
      - Deformity (swelling)
      - Pain
      - Sensation
      - Movement/function
      - Strength
      - Tenderness on palpation
      - Ability to bear weight

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Fractures

- **Clinical Findings**
  - Pain
    - Point tenderness on palpation, at rest, with movement / ROM, with ambulation
  - Swelling
  - Deformity
  - Ecchymosis
  - Inability to bear weight
  - Loss of function to injured area
- **Diagnostic Studies** (Emergency Department/UC/ outpatient)
  - X-rays (AP & lateral)
  - CT

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Fractures

- **Management**
  - Pain control
  - Immobilization/Splinting
  - Ice
  - Elevation
  - Ortho referral
  - Crutches (size & teaching)
  - Antibiotics if open fracture

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Fractures Unique in Children

- Salter-Harris (growth plate)
- Torus (buckle)
- Greenstick
- Bowing
- Avulsion

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Salter-Harris Fractures

- "Growth Plate Fractures"/physeal fractures
- 18-30% of pediatric fractures are physeal fractures
- Most common at times of rapid growth (puberty)
- More common in adolescents than younger children (peak incidence is 11-12 years old)
- Usually occur in the upper limbs

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Salter-Harris Fractures

- Always a history of trauma
- About 30% of physeal fractures will cause a growth disturbance
- About 2% of physeal fractures will cause a functional growth deformity
- Classified I to V using Salter-Harris Classification system (most widely used physeal fracture classification system)

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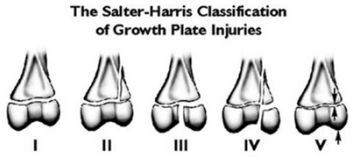
Salter-Harris Classification

- S ame
- A bove
- L ower
- T hrough
- crush



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Salter-Harris Classification

- **Type I**
  - Separation of metaphysis from epiphysis through zone of provisional calcification (epiphyseal separation)
  - Usually benign with little chance of growth disturbance
  - Seen most frequently in infants and toddlers
  - When x-rays are negative, but patient has point tenderness over a growth plate, consider it Type I, splint, and refer to ortho
  - May not show up on x-ray until 7-10 days after the injury
- **Type II**
  - Most common pediatric physeal fracture (75% of all physeal fractures)
  - Similar to Type I, except a portion of metaphyseal bone is displaced with the epiphyseal fragment
  - Fracture line crosses the germinal growth plate towards the metaphysis
  - Usually a good prognosis, but refer to ortho

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Salter-Harris Classifications

- **Types III /IV& IV**
  - Intra-articular injuries that also involve the growth plate
  - III-separation lower than growth plate, involving epiphysis
  - IV-injury through the metaphysis, plate, & epiphysis
  - Anatomic position must be established to restore normal joint mechanics and prevent growth arrest
  - Need ortho consult, while in ED, because patient is at increased risk of growth disturbance, altered joint mechanics, & functional disability
- **Type V**
  - Axial compression of the germinal growth plate
  - Hard to diagnose but leads to permanent injury
  - Usually diagnosis is not made until growth arrest becomes evident

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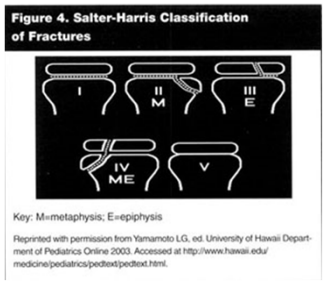

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Torus (buckle) Fractures

- 15% of pediatric fractures
- Common in young patients
- Occur from a compressive load
- Occur in the metaphyseal region of a bone
  - at the junction of the metaphysis & diaphysis
- Cortex of the bone buckles
- As children mature, the metaphyseal region becomes stronger, and the incidence of this fracture type declines

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Torus (buckle) Fractures

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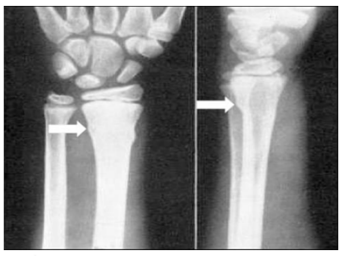
Torus (buckle) Fractures



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Greenstick Fractures

- Most common fracture in children
- Account for up to 50% of fractures before age 12
- Incomplete fracture
- Occurs at diaphysis-metaphysis junction
- Cortex remains intact on one side
- Applied force is released before fracture is completed
- To obtain anatomic reduction, fracture must be completed first (ortho consult)

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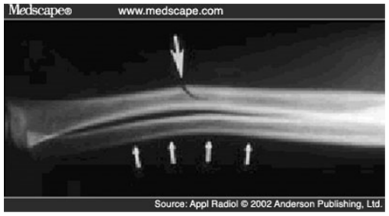
Greenstick Fractures



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Bowing Fractures

- Caused by longitudinal force
- Force stops short of creating a fracture
- Force causes persistent bowing of the bone
- Cosmetic and functional deficits are common
- Refer to ortho

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Bowing Fracture (Left ulna)

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Bowing Fracture(Right & Left comparison)

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Avulsion Fractures

- Fracture through the apophyseal plate
- Caused by an intense muscle contraction that creates a fracture through the apophyseal plate
- Apophyses-secondary ossification centers in the developing skeleton, where strong muscular attachments adhere
- Most common in pelvis, heal, tibial tubercle, & phalanges
- Infrequently require reduction
- Conservative care

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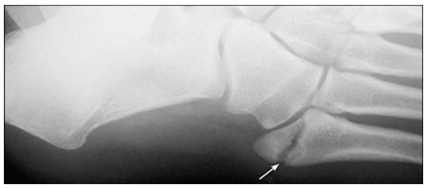
Avulsion Fracture (5th Metatarsal)



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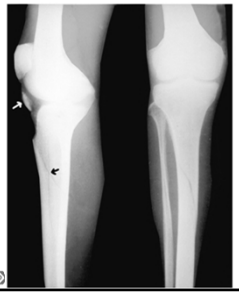
Avulsion Fracture (Tibial tuberosity)



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Child Maltreatment & Fractures

- **Consider the possibility of child abuse if…**
  - The history is not consistent with the injury
  - There is an inconsistent history or changing story
  - There has been a delay in seeking treatment
  - The injury is inconsistent with the child's developmental stage
  - There are other physical findings that indicate abuse
    - Usually in different stages of healing

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Fractures Strongly Suggestive of Child Abuse

(when no history of accidental trauma)

- Metaphyseal fractures
- Multiple, complex, or depressed skull fractures
- Rib fractures
- Sternal fractures
- Scapula fractures
- Spiral fractures of the humerus
- Spiral fractures of the femur or tibia in Pre-ambulating children
- Avulsion fractures of the clavicle and acromion process

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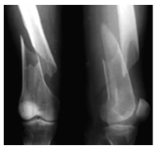
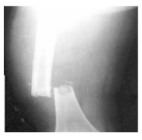
Femur Fractures

- Concerning for abuse in non-ambulatory child
  - Spiral fractures
    - Significant rotational forces
  - Transverse fractures
    - Significant tensile or bending load





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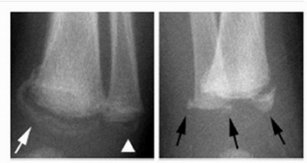
Metaphyseal Fractures

- "Bucket handle" or corner fractures
- Virtually pathognomonic of abuse
- Result of violent shaking or stretching of limb
- Most common locations
  - Femur
  - Tibia
  - Humerus



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Rib Fractures

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When Child Maltreatment is Suspected…

- Be an advocate for the child!!!
- Notify ED social worker/MD
- Collaborate with ED MDs & local Child Abuse MDs
- Notify child protective services and law enforcement
- Plan for further work-up
  - Skeletal survey
  - labs

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Strains vs Sprains

- **Sprain: Injury to a ligament, joining bone to bone around a joint**
  - Common in older adolescence, after growth plates are closed (ligaments stronger than physis)
  - Common in young adults & middle-aged adults
  - Usually, a result of trauma
  - Usually caused by an outside force (contact sports)
  - Ankle sprains are the most common
  - Other common sites are the knee, shoulder, elbow, and wrist
- **Strain: Injury to a muscle or muscle-tendon unit, joining muscle to bone**
  - Not common in children
  - Most common in middle-aged & older adults
    - Decreased muscle elasticity with aging, so muscle is more susceptible to injury
  - Usually from a dynamic injury, not usually contact sports
  - Can be from repetitive motions over time

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Classification

- **Classification of Strains**
  - **Grade I**
  - Mild tenderness
    - Usually able to bear weight
  - **Grade II**
    - More severe pain
    - Restricted movement
    - Swelling, ecchymosis
  - **Grade III**
    - Gross defect in the muscle
    - Severe pain
    - Swelling, ecchymosis
- **Classification of Sprains**
  - **Grade I**
    - Stretched ligament
    - Normal joint stability
    - Can usually bear weight
  - **Grade II**
    - Partial tearing of ligament
    - Some joint instability
    - Pain with weight bearing
    - Swelling, ecchymosis
  - **Grade III**
    - Complete ligament tear
    - Unstable joint
    - Swelling, ecchymosis, deformity
    - Unable to bear weight

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Strains & Sprains

- **Assessment**
  - **History**
    - Location of Injury
    - Mechanism
    - Timing/onset
    - Witnesses
    - Use of protective equipment
    - Pain
- Disability
- Deformity
- Open wounds
- Neurovascular function
- Motor Strength
- Aggravating/relieving factors
- Pre-hospital interventions
- Pertinent medical/surgical history

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Strains & Sprains

- **Assessment**
  - **Physical**
    - **Focused assessment of injury**
      - Include joints/structures above & below injury
      - Compare to unaffected side
      - Skin color & temperature
      - Pulses /cap refill
      - Deformity (swelling)
      - Pain
- Sensation
- Movement/function
- Strength
- Tenderness on palpation
- Ability to bear weight

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Strains & Sprains

- **Clinical Findings**
  - Pain
    - On palpation, at rest, with movement / ROM, with ambulation
  - Swelling
  - Ecchymosis
  - Inability to bear weight
- **Diagnostic Studies** (Emergency Department)
  - X-rays- if fracture suspected

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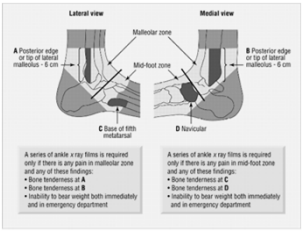
Strains & Sprains

Ottawa Ankle Rules



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Strains & Sprains

- **Management**
  - Depends on grade of injury
  - RICE
  - NSAIDS
  - Ace wrap, Ankle Lacer/ Pneumonic Walker, splint (depending on severity of injury)
  - Crutches (sizing & teaching) if pain with weight bearing
  - 2-5 days post injury start gradual ROM & weight bearing, RICE after
  - NO sports until pain free and can perform all sports-specific activities without pain
  - Refer athletes to ortho/sports medicine
  - Severe Grade II and Grade III injuries require splinting & ortho referral
  - When symptoms are out of proportion to the injury, refer to ortho

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Radial Head Subluxation

"Nursemaid's Elbow"

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Radial Head Subluxation

- A partial dislocation of the radial head
- A common injury in infants/children less than 5 years old (due to increased ligamentous laxity)
- Occurs after a traction force is applied to the extended arm
- History of arm pulling, jerking, or yank
- Usually no history of an injury or trauma
- Infant/child refuses to use arm, holds arm in a neutral position, and cries when arm is moved

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Radial Head Subluxation

- Mechanism
  - Abrupt axial traction is applied to the wrist or hand of the extended, pronated forearm
  - This causes the annular ligament to become partially detached from the radial head
  - The radial head then slips into the radio humeral joint where it becomes entrapped

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Radial Head Subluxation

- **Assessment**
  - **History**
    - Mechanism (if known)
    - Witnesses
    - Timing/onset
    - Pain
    - Arm use
    - Arm position
    - Pre-hospital interventions
    - Previous nursemaid's elbow
- **Assessment**
  - **Physical exam**
    - Inspection
    - Palpation
    - ROM
    - Neurovascular function

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Radial Head Subluxation

- **Clinical Findings**
  - Child not using affected arm
  - Holds arm by side with elbow slightly flexed, and the forearm pronated
  - Resists supination
  - ROM to elbow elicits pain
  - Refuses to lift arm above head
  - Tenderness over the radial head
    - No other point tenderness

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Radial Head Subluxation

- **Diagnostic Studies**
  - None recommended when the history, clinical presentation, and exam are classic
  - X-rays are NOT helpful
  - If x-rays are obtained, and patient has a subluxated radial head, the x-ray will appear normal

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Radial Head Subluxation

- **Management**
  - Pain control (ibuprofen or acetaminophen)
  - Reduction (2 techniques)pination & Flexion

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Radial Head Subluxation

- **Management**
  - Reduction (continued)
    - Hyper-pronation- forearm is pronated with the elbow in extension
  - With both reduction techniques, the thumb of one hand should be placed over the patient's radial head
  - This is where the "pop" is usually felt in a successful nursemaid's reduction

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Radial Head Subluxation

- **Management**
  - Post Reduction
    - Patient should begin fully using affected arm within a few minutes of a successful reduction
    - An exception is a patient that has had the nursemaid's elbow for 1-2 days
      - Slower to use
      - Associated swelling of the annular ligament
    - Consider x-ray/other injury if…
      - 2 unsuccessful reduction attempts
      - History/assessment inconsistent with classic nursemaid's elbow
    - If unable to reduce – splint and follow up with Ortho

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Osgood-Schlatter Disease

- Overuse injury in the growing child
- Repetitive microtrauma to the tibial tubercle apophysis causing painful enlargement of the tibial tuberosity, at the insertion of the patellar tendon
- From repetitive pulling of the quadriceps during a time of rapid growth
- Usually age 10-16
- Males>females
- Active in sports
- Can be unilateral or bilateral
- Can have associated microscopic avulsion fractures

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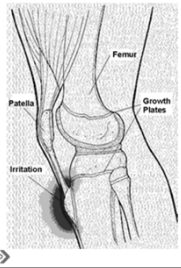
Osgood-Schlatter Disease



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Osgood-Schlatter Disease

- **Assessment**
  - Specific injury (gradual or sudden onset)
  - Pain (location, aggravating/alleviating factors, etc.)
  - Timing/onset
  - Sports/activities
  - Pre-hospital interventions
- **Physical Exam**
  - Inspection
  - Palpation
  - ROM
  - Neurovascular function

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Osgood-Schlatter Disease

- **Clinical Findings**
  - Report of pain to anterior knee
  - Exacerbated by running, jumping, kneeling, other sports activities
  - Pain with kneeling
  - Tenderness and swelling over the tibial tubercle
  - Normal knee ROM
  - Stable knee and patella

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Osgood-Schlatter Disease

- **Diagnostic Studies**
  - Usually diagnosed on PE, but if unilateral or severe symptoms consider radiographs
  - X-rays of knee (AP & lateral)
    - May be normal or show soft-tissue swelling
    - May show small spicules of ossification anterior to the tibial tuberosity

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Osgood-Schlatter Disease

- **Management**
  - Stretching and strengthening exercises
  - Ice/RICE after sports activities
  - NSAIDs
  - Protective knee pads
  - If severe symptoms
    - Ortho referral/consult
    - Knee immobilizer/crutches
    - Discontinued/modified sports activities
    - Surgery (extreme cases)

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