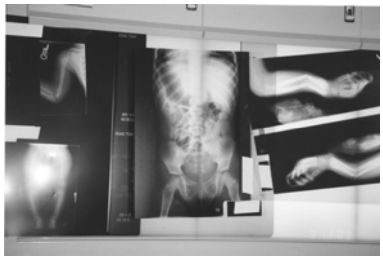
Nontraumatic Orthopedic Emergencies



Objectives

- Understand the pathophysiology of nontraumatic orthopedic conditions.
- Describe the management of nontraumatic pediatric orthopedic problems.
- Identify radiographic findings helpful in the diagnosis of many orthopedic injuries.

Case Study 1: "Can't Move Right Arm"

- 2-year-old boy was swinging on a jungle gym at park.
- Unable to lift right arm
- Pain appears localized to elbow
- No swelling, deformity, or focal tenderness

Initial Assessment

PAT:

– Normal appearance, normal breathing, normal circulation

Focused History

O: Sudden
P: Provoked by lifting right arm
Q: Sharp
R: With immobility
S: Severe
T: Ever since jungle gym

Questions

What are the possible diagnoses?
How should you proceed?

Differential Diagnosis: What Else?

- Fracture
- Dislocation
- Osteomyelitis
- Septic arthritis
- Cellulitis
- Tumor

Nursemaid Elbow: Background

- Occurs between ages 1and 5 years.
- Precipitated by traction on arm
  - Swinging by wrists
  - Pulling by arms
  - Struggling into a coat
- Entrapment of annular ligament between radial head and capitellum

Clinical Features: Your First Clue

- History of traction to arm or swinging of child by arms
- Absence of edema, focal tenderness, or bruising of upper extremity
- Child holds arm by side, will not raise it over shoulders

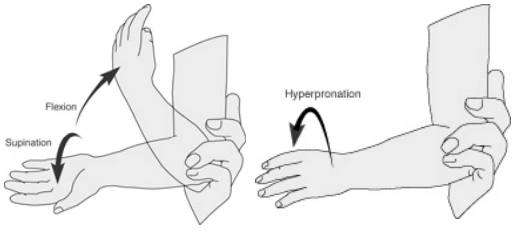
Diagnostic Studies

- None needed if diagnosis is secure
  - Classic history
  - No focal tenderness, bruising, or edema
- Radiographs of elbow in equivocal cases

Management

- This is your chance to be a MAGICIAN!
  - Reduce in ED, and patient goes home fixed.
- Two methods
  - Supination and flexion
  - Hyperpronation method

Maneuvers



Case Progression/Outcome

- Reduction successful with hyperpronation.
- Letter of commendation sent to administration!

Case Study 2: "Left Knee Pain"

- 12-year-old boy collided with another boy while playing baseball.
- Right knee pain intermittent x 2 months
- Denies hip, ankle, or foot pain
- Lying on stretcher with hip in flexion, abducted, and externally rotated

Detailed Physical Examination

- Weight: 90th percentile for age
- Height: 25th percentile for age
- Knee, ankle, and foot are normal
- Pain with any hip movement

Questions

What is your general impression of this patient?

What is your differential diagnosis?

What diagnostic studies would you order?

Differential Diagnosis: What Else?

- Toxic synovitis
- Septic arthritis
- Legg-Calvé-Perthes disease
- Chondromalacia patellae
- Osgood-Schlatter disease
- Slipped capital femoral epiphysis

SCFE: Background

- Incidence: 1-3/100,000
- Occurs during early adolescence
- Increased forces during growth spurt
- Males 2 times as frequent as females
- Obese in 2/3 of cases
- *Can* become bilateral in up to 40% of children

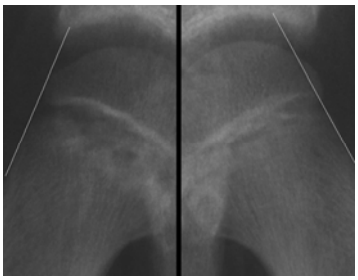
Clinical Features: Your First Clue

- Obese preadolescent or adolescent
- Often weeks to months of discomfort
  - Acute visit precipitated by trauma
- Limp
- Hip, thigh, groin, or knee pain
- Decreased range of motion of hip

Diagnostic Studies

- Radiology
  - AP pelvis and frog-leg of hips
- Signs
  - Physeal widening
  - Klein line
  - Epiphysis inferior and posterior
  - Disruption of Shenton line

Klein Line



Management

- Bed rest
- Pain management
- Relief of muscle spasms
- Definitive treatment is surgical.
  - Screw placed through femoral neck

Case Progression

- SCFE diagnosed bilaterally.
- Patient placed on bed rest, given pain control, and admitted.
- Surgical correction occurred the next day.

Case Study 3: “Limp”

- 6-year-old boy with right-sided limp for 3 months.
- No fever, chills, or recent illnesses
- Normal examination including range of motion in ankle, knee, and no bony tenderness except pain on movement of right hip

Questions

What is your general impression of this patient?

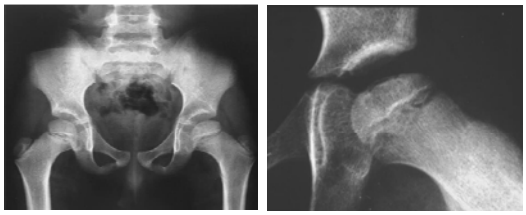
What is your differential diagnosis?

What are your initial management priorities?

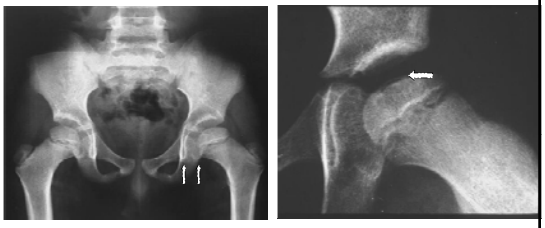
Differential Diagnosis: What Else?

- Toxic synovitis
- Septic arthritis/osteomyelitis
- Fracture
- Tumor/metastasis
- Avascular necrosis (Legg-Calvé-Perthes disease [LCP])

Radiograph



Radiograph: LCP



Legg-Calvé-Perthes Disease

- Avascular necrosis leading to collapse, fragmentation, and then reossification
- Most frequent between 4 and9 years
- Boys more often than girls
- Bilateral in 10% of cases

Clinical Features: Your First Clue

- Knee or hip pain
- Limp
- Shortened limb
- Limited range of motion of hip

Diagnostic Studies

- Radiology
  - AP and frog-leg pelvis radiographs
- Findings
  - Femoral head smaller and cartilage space appears wider
  - Crescent sign
  - Fragmented femoral head—less radiopaque
- MRI

Management

- Disease is self-limited – limp can last 2 to 4 years
- Nonsteroidal anti-inflammatory agents
- Limit activities
- Crutches/braces occasionally needed
  - May help maintain spherical femoral head
- Better outcomes in younger children

Case Progression/Outcome

- LCP disease explained to parents.
- Outpatient evaluation scheduled with orthopedics.
- Patient started on NSAIDs and limited activity.
- Remodeling occurred over 2 years with a good outcome.

Case Study 4: "Fever and Refuses to Walk"

- Father brings 2-year-old girl to ED with fever and refusal to walk.
- She was well until day prior to presentation.
- Previously completely healthy
- Screams with diaper changes

Initial Assessment and Detailed Physical Examination

- Initial assessment :
  - Tired but nontoxic
- Detailed physical examination:
  - Febrile to 39°C
  - Only uncomfortable when left leg is raised
  - Pain with motion of left hip
  - Remainder of examination is completely normal

Questions

What is your general impression of this patient?

What is your differential diagnosis?

Differential Diagnosis: What Else?

- General impression:
  - Stable with fever
- Differential diagnosis:
  - Septic arthritis/osteomyelitis
  - Toxic synovitis (age 3-8 years)
  - Juvenile rheumatoid arthritis
  - Rheumatic fever
  - Leukemia
  - Henoch-Schönlein purpura

Diagnostic Studies

- CBC, CRP, or ESR
- Hip radiographs
  - AP and frog-leg
- Hip ultrasonography
- Evaluation of joint fluid
- Antibiotics and surgical intervention

Case Discussion

- Septic arthritis is a true surgical emergency!
- Increased intraarticular pressure interferes with adequate blood supply.
- Proteolytic enzymes can break down intraarticular cartilage.

Septic Arthritis: Background

- Occurs in all age groups
  - More common in younger children
- Majority of cases in lower extremity
- Mechanism of entry
  - Hematogenous seeding
  - Local spread
  - Traumatic or surgical introduction of bacteria

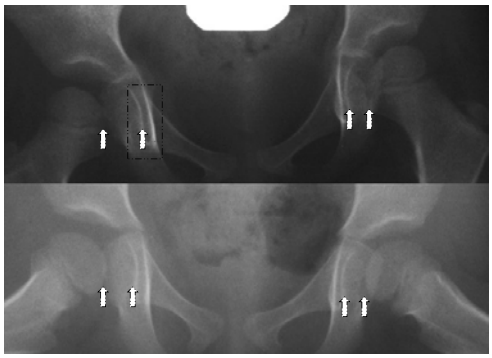
Clinical Features: Your First Clue

- Irritability
- Fever
- Erythema
- Limp/refusal to walk
- Decreased range of motion of limb

Position of Comfort With Hip Effusion

Diagnostic Studies

- Radiology
  - Radiograph may be nondiagnostic
  - Ultrasonography helpful in detecting fluid
- Laboratory
  - CBC
  - CRP (more helpful than ESR)



Management

- Once the diagnosis of septic joint is made, surgical intervention should proceed ASAP.
  - Needle aspiration or open surgical drainage required

Synovial Fluid Findings

TABLE 12-4 Synovial Fluid Findings in Different Types of Arthritis.

	Character	WBC count (/uL)	PMNs (%)	Mucin clot	Other
Normal	Clear; yellow	<200	<10	Good	
Juvenile rheumatoid arthritis	Turbid	250–50,000	50–70	Fair to poor	50% with decreased complement
reactive arthritis	Cloudy to turbid; can be clear	1,000–150,000	50–70	Fair to poor	Increased complement
Lyme arthritis	Turbid	500–100,000	>50	Poor	
Septic arthritis	Turbid; white-grey	10,000–250,000	>75	Poor	Low glucose High lactate

Septic Arthritis Treatment by Age

TABLE 12-3 Septic Arthritis Pathogens and Treatment

Age	Organism	Treatment
Birth to 2 months	Group B Streptococcus *S aureus* Gram-negative rods	Nafcillin 50 mg/kg and gentamicin 2.5 mg/kg
2 months to 3 yr	*S aureus* *H influenzae* *S pneumoniae*	Nafcillin 50 mg/kg and ceftriaxone 50 mg/kg (consider vancomycin 10 mg/kg)
3 years to 12 yr	*S aureus* *S pneumoniae* *S pyogenes*	Nafcillin 50 mg/kg and ceftriaxone 50 mg/kg (consider vancomycin 10 mg/kg)
> 12 yr	*S aureus* *S pneumoniae* *N gonorrhoeae*	Nafcillin 50 mg/kg and ceftriaxone 50 mg/kg (consider vancomycin 10 mg/kg)

Case Progression/Outcome

- Patient was immediately started on ceftriaxone and nafcillin.
- Hip aspiration showed 100,000 WBCs and Gram positive organisms.
- Patient was taken to operating room for arthrotomy and irrigation of joint.

Case Study 5: "Left Leg Looks Different"

- Mother brings healthy 5-week-old to ED because left his leg looks different than right
- Initial assessment is normal, as are vital signs.
- On physical examination you note asymmetric skin folds, a "clunk" on Ortolani maneuver, and decreased abduction of left hip.

Developmental Dysplasia of the Hip

- Occurs in neonatal period
- More common in first-borns and breech position deliveries
- Association with congenital muscular torticollis and metatarsus adductus

Ortolani and Barlow Maneuvers

TABLE 12-1 Ortolani and Barlow Maneuvers

Ortolani (Reduction) Maneuver	Barlow (Provocative) Test
• Stabilize the pelvis with one hand. • With the other hand, slightly abduct the infant's hip. • With the index and long fingers over the greater trochanter, pull the thigh up to gently reduce the hip.	• Stabilize the pelvis with one hand. • Place the thumb on the inner aspect of the thigh near the lesser trochanter. • Adduct the hip. • Exert downward pressure on the thigh with the thumb, pushing it into the table.

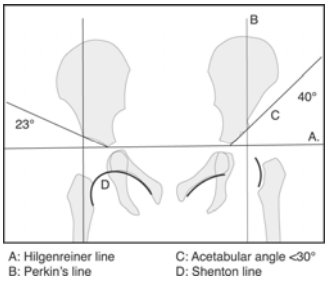
Clinical Features: Your First Clue

- Asymmetric hip creases
- Positive Barlow and/or Ortolani maneuver
- Limited abduction of hip

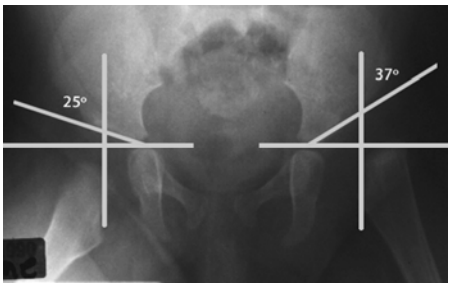
Diagnostic Studies

- Dynamic ultrasonography in neonates and young infants
- Plain AP pelvis and frog-leg views in older infants and children

Radiology (1 of 2)



Radiology (2 of 2)



Management

- Birth:
  - Harness, splints, triple diaper techniques
- 1-6 months:
  - Pavlik harness
- 6-18 months:
  - Closed reduction

Case Progression/Outcome

- As patient was only 5 weeks old, ultrasonography was performed and confirmed developmental dysplasia.
- Infant was referred to pediatric orthopedics, and placed in Pavlik harness.

The Bottom Line

- Causes of nontraumatic orthopedic emergencies vary with age.
- Always examine the hips in patients with knee pain.
- Radiographs are often needed to establish the diagnosis.
- Prompt orthopedic referral for specific conditions