

## **ALL OF PEDIATRIC ORTHOPEDICS IN A NUTSHELL: THE LIMPING CHILD**

### **SPECTRUM OF ILLNESS**

Mild limp ----- Refusal to bear weight  
**Differential diagnosis is the same!**

### **THE 6 DIFFERENTIAL DIAGNOSES OF A LIMPING CHILD**

#### **I. ONE Pediatric Leg Thing**

- Toddler's Fx

#### **II. TWO Pediatric Knee Things**

- Osgood-Schlatter's
- Patellar Overuse Disorders (eg-- Patellar Tendonitis, Chondromalacia Patella, etc)

#### **III. THREE Pediatric Hip Things (Occur by Age)**

- SCFE 10 - 15 y.o.
- Legg-Calves-Perthes 5 - 9 y.o.
- Toxic Synovitis 9m – 6 y.o. (peak prevalence at 2-3 y.o.)

#### **IV. SEARCH “FOR” Salter I Fracture or other trauma**

ALWAYS INSPECT (for bruising) & PALPATE (for tenderness) the entire extremity  
Tenderness over a growth plate with negative xray = Salter I Fracture

#### **V. The FIVE Causes of Joint Pain or Arthritis In A Child:**

##### **1. Trauma**

- ◆ Fracture
- ◆ Sprain

##### **2. Infections**

- ◆ Serious – Septic joint, osteomyelitis
- ◆ Benign – Post viral, EBV, post streptococcal

##### **3. Rheumatologic**

- ◆ JRA
- ◆ IBD/Crohn's
- ◆ Rheumatic Heart Fever
  - If history of severe joint pain at home with episodes of pain where patient can't ambulate but with benign exam in ER, then rule out Rheumatic Fever:
    - Get EKG and ESR

#### 4. Vasculitides

- ◆ Lupus
- ◆ Henoch-Schonlein Purpura

#### 5. Malignancy

- ◆ Workup includes radiograph and CBC

### VI. SIXTH - LAST, BUT NOT LEAST -

#### Non-Musculoskeletal Causes of Limp Must Also Be Ruled Out

Also remember to rule out nonmusculoskeletal (i.e. abdominal) cause of limp:

APPENDICITIS, OVARIAN TORSION, TESTICULAR TORSION

- Do a full exam including lower abdomen and testicle
- Ask about symptoms that might point away from a musculoskeletal cause such as vomiting or abdominal or scrotal pain.

## CLINICAL PEARLS FOR THE ED

### 1. Knee Pain = Hip Pain

In a limping child without obvious knee trauma or impressive localized knee findings on exam (not just mild knee findings) knee pain equals hip pain and in a limping child always get hip x-rays with complaints of knee pain (ie- “**bilateral hips with frog’s legs view**”) to rule out SCFE, even if knee pain is mild enough to not necessarily need knee films.

CAVEAT: When ordering hip films in any age child, always include ‘frog’s legs view’ since there are uncommon cases of SCFE even at younger ages (i.e. 5 yo)

### 2. ALWAYS include BOTH 1) septic joint and 2)osteomyelitis in your differential diagnosis of any limping child.

### 3. Septic Joints In Children vs Adults:

- In adults, septic joints tend to be ‘fixed’, and characterized clinically by inability of the patient to actively move the joint and refusal to allow the examiner to do so; however children WILL have some range of motion (but not complete or near-complete), so you need to lower your threshold to tap a joint even in children with some range of motion, if the exam and findings are otherwise impressive for a septic joint.
- A normal (or near-normal) range of motion by the patient effectively rules out a septic joint in a child.

## INFANTS & TODDLERS

**Hardest and most challenging age group to evaluate in the ED:**

Because they are nonverbal and will not usually localize pain for you.

**Main differential in the infant & toddler age group:**

Septic Hip vs Toxic Synovitis

## TIPS FOR RULING OUT SEPTIC HIP IN AN INFANT OR TODDLER

Maneuvers which narrow hip joint capsule and bring out pain if septic hip or hip joint effusion is present – **Internal rotation of hip & Hip extension**

- a. Easy to remember because patients with hip injuries will assume opposite position of hip flexion and external rotation to relax/open the hip joint capsule
- b. Therefore it is useful to observe position patient assumes while left alone at rest, both supine and sitting (ie – while sitting does the patient tripod with arms to take weight off the affected painful hip)
- c. Best method to test internal rotation of hips in child is prone on the belly with knees flexed and let lower legs (now pointed vertically upwards) naturally fall of laterally to sides (see if child keeps one leg more upward vertically than the other to prevent hip pain from internal rotation); next you can move legs outward – internal rotation – as much as possible to see if pain is elicited
- d. CLINICAL PEARL:  
Even if a child refuses to bear weight (usually considered at the most severe end of the “limping child” spectrum of illness), absence of pain on a full range of motion on flexion, extension, and internal rotation (by the examiner, using technique described above) is considered an ‘equivalent’ of bearing weight and rules out the diagnosis of septic hip.

## CLINICAL APPROACH (ALGORITHM)

### STEP #1 History

- i. Onset
- ii. Can Parent (or Child) Localize Pain
  1. Which extremity?
  2. Which part of extremity?
- iii. Known history of recent trauma
- iv. Recent cold or URI
- v. Fever
- vi. Vomitting
- vii. Abdominal or scrotal pain
- viii. Similar episodes in past
- ix. Significant PMHx
- x. Course: improving, same or worse since onset?

## STEP #2 Physical Exam

Careful and Full physical

1. Well or Ill-Appearing?
2. Fever?
3. Observe extremity in position of rest
4. Clothes off to look for bruises (trauma) or rash (zoster, HSP)
5. Distal extremity exam and pulses
6. Observe, feel, and range joints
7. Palpate the entire extremity
8. Examine the abdomen

## STEP #3 Provide mild NSAID analgesia (ibuprofen)

Main problem in the ER is ruling out the diagnosis of septic hip and clear cut clinical improvement with mild analgesia essentially rules out a septic hip (although osteomyelitis is still a possibility) – so give Motrin early so it can start working and take effect while you're waiting for lab and X-ray results

## STEP #4 Based on your H&P (including refusal to bear weight or severity of limp and any physical exam findings), establish your “level of concern” for either the presence of a fracture or septic hip.

## STEP #5 Decision to X-ray :

<u>Option 1</u>	<u>Option 2</u>	<u>Option 3</u>
Area of pain localized by history and exam	Mild limp, no localized area of pain, tenderness by exam, “level of concern low”:	Level of concern moderate to high, pain not localized
X-ray that area	Either: 1) Do only tib/fib x-ray to rule out toddler's fx and/or hip x-rays  OR  2) No x-ray or further workup. Start NSAID and PMD follow-up	X-ray entire extremity

**STEP #6: If x-rays are negative (no Fx):**

If NO HISTORY OF FEVER and low level of concern and/or marked improvement after Motrin

Consider diagnosis of musculoskeletal sprain

- a. Discharge on Motrin
- b. 24 hr follow up with PMD

However, proceed with further workup for septic hip vs. toxic synovitis if ANY of the following:

1. Is there any history of fever?
2. Is your degree of concern still moderate-to-high (i.e. based on severity of limp and/or lack of improvement on Motrin)?

If the answer is yes, then:

Do labs:

- a. Blood Cx
- b. CBC c Diff
- c. ESR
- d. CRP (to help rule out osteomyelitis)

Study by Kocher\* looked at the utility of 4 predictors for differentiating septic hip vs toxic synovitis

- WBC 12,000
- ESR 40
- H/o fever
- Non weight-bearing (i.e. severe limp)

STUDY RESULTS	
Number of predictors positive	Likelihood of Septic Hip
0	<0.2%
1	3%
2	40%
3	93.1%
4	99.6%

\*Kocher MJ, Zorkowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. J Bone Joint Surgery 1999; 81:1662-70

- Clinical caveat: however, even in the presence of fever, elevated ESR, and elevated WBC (i.e. all those 3 predictors positive) clinical improvement essentially rules out a septic hip (but osteomyelitis is still not yet ruled out!)
- Obtain Ortho consult

### **STEP #7: Does this patient need to go to the OR now?**

- ◆ If patient is clinically improving with Motrin while in ED, then not a septic hip, and no OR indicated.
- ◆ However, osteomyelitis may still be in the differential diagnosis, especially if impressive exam and/or elevated labs (i.e. WBC, ESR, CRP) and fever.
- ◆ Main problem in ED is ruling out a septic hip, because this needs emergent joint tap (in OR) without delay. Ultrasound is not a reliable diagnostic test for septic joint and MRI is not usually an ER option for a toddler (i.e. anesthesiologist not usually available for sedation and/or MRI not feasible in a timely manner). Need for an OR tap needs to be a clinical decision based on exam, lack of improvement, and labs. Attending (ED)- to--Attending (Ortho) discussion.
  - If you are concerned about a septic hip:
    - patient needs an emergent tap in OR

### **STEP #8 Disposition**

- ◆ Discharge with diagnosis of transient synovitis and 24 hr follow up if :
  - Labs OK
  - Significant clinical improvement
  - Degree of limp is mild
- ◆ Admit if:
  - Degree of concern high (i.e. severe limp) without improvement (for OR)  
OR
  - History of fever and very abnormal labs (for observation and bone scan or MRI to rule out osteomyelitis)

## **IMAGING STUDIES**

### **MRI vs. Bone Scan for Osteomyelitis :**

- ◆ MRI is best test for occult fracture, osteomyelitis, joint effusion – BUT it usually requires sedation in infants and toddlers.
- ◆ Bone scan is more easily obtained for the ED, does not require sedation and can rule out osteomyelitis

### **Ultrasound & MRI for Ruling Out Septic Hip**

- ◆ Ultrasound is very operator and experience dependent and not universally considered accurate for detection of a hip effusion.
- ◆ MRI is accurate, but since septic hip is a true emergency, MRI is not usually an ER option for an infant or toddler (i.e. anesthesiologist not usually available for sedation and/or MRI not feasible in a timely manner).

\*\*\*\*\* END \*\*\*\*\*