

# Lower Extremity Conditions in Pediatrics

Everything you need to know – in 15  
minutes!

## Most Important Point:

- Thigh or knee pain in a child should prompt an x-ray of the hip.

## Infection vs Synovitis

- Septic arthritis (all joints)= 0.25% of peds admissions
  - 41% of those are hips
  - 70% are between 1 and 5 years of age
  
- Transient synovitis = up to 1% of ped ER visits

How do we tell the difference?

## Kocher Criteria

Clinical Features Present	Likelihood of Infection
1	9.5%
2	35%
3	72.8%
4	93%

Fever > 38.5 C	ESR > 40 mm/hr**
WBC >12K cells/mL	Hx of Non Wt Bearing

## Clinical Features of Septic Hip

- Septic kids look septic
- Limitation of motion is dramatic
- Does not respond to NSAIDS or time



## What to do?

- Don't hesitate to call / refer
- If in doubt, admit
  - MUST have iron-clad next day follow up at a minimum
- NSAIDS, rest
- No antibiotics
- Plain x-rays and ultrasound

## Dysplasia

- Different scenarios in younger vs older child
- Younger Child:
  - \*\*\*Should be painless in young child\*\*\*
  - Trendelenburg or Waddling gait
  - Evaluate for asymmetry
- Older Child:
  - May have pain from degeneration or impingement
  - Pain or fatigue from abductor weakness

## Epidemiology

- 1/1000 Dislocated; 10/1000 Subluxable or Dysplastic
- Gender: 80% female
- Laterality: 60% left 20% right; 20% both
- Position: Breech

## The At Risk Family

- A child's risk of DDH is:
  - 6% with normal parents and an affected sibling.
  - 12% with one affected parent only.
  - 36% with one affected parent and one affected sibling.

## Ultrasound Recommendations

- No Consensus.
- AAP:
  - No routine screening.
  - Screening for breech girls or girls with family hx.
  - Optional for breech boys.
- Canadians:
  - No screening even in high risk.
- Europe: ??

## Why the Controversy?

- ~70% of abnormal hips ID'd on exam resolve spontaneously.
- ~90% of subtle abnormalities seen on u/s resolve spontaneously.
- Treatment is not necessarily benign.
  - AVN
  - Expense (time, money, clinic space...)

## My Suggestions for Newborns:

- Frank dislocation: refer at two weeks of life
- Female breech or with strong fam hx: 6 wk u/s, serial exam.
- Other risk factors or “concerning” exam: re-examine at 2 weeks, u/s if still concerning.

## Perthes

- Some ischemic event of the proximal epiphysis
- Skinny, hyper, 4-8 yo caucasian boys
- Present with a limp that is often painless
  - Pain presents later in the course of disease
- Decreased ROM, especially in rotation
- Plain X-Ray is only imaging routinely needed
  - May be normal early on – rely on suspicion
  - \*\*\*BILATERAL Perthes is almost never symmetric\*\*\*

## What to do?

- Brief periods of bed-rest and/or crutches during flare-ups
- NSAIDS
- Plain X-Rays (AP pelvis)
- Routine clinic referral

## SCFE

- 50% are obese
  - 50% aren't!
- Typically early adolescent boy
  - Pacific islander>african american>cauc>asian
- \*\*\*Referred knee pain common\*\*\*
- Onset can be chronic or acute
  - Acute often with definite trauma history

## Typical Radiographs



\*\*\*In spite of rumors to the contrary, get an AP and a Lateral\*\*\*

## What to do?

- Make the child NON Weight Bearing
- Make the child N.P.O.
- Call one of us for immediate clinic referral or send patient to E.R.
- Essentially always a surgical indication

## Lower Extremity Morphology

“The art of medicine consists in amusing the patient (parent) while nature cures the disease.”

Voltaire

## Intoeing / Assessing Rotation

- Observe gait for overall “Foot Progression Angle.”
  - Normal approx 5 ° internal to 15 ° external.
  - Intoeing “severe” at greater than 15 °.

## Hip Rotation

- Child prone, pelvis level.
  - Internal rotation normally approximately 30-70 °.
    - Normally decreases with growth.
  - External rotation also approximately 30-70 °
- However, in any given patient TOTAL rotation tends to be about 100 °
- Watch for asymmetry.

## Tibial Version

- Child still prone.
- Thighs flat on table, knees at  $90^\circ$ , feet in natural resting position.
- Look down on soles of feet and observe angle subtended on the thighs.
- Also take opportunity to observe shape of the bottom of the foot.

## Tibial Version

- Thigh-Foot Angle normally neutral in newborn with  $20^\circ$  on either side within SD.
- With growth, gradually assumes  $1-15^\circ$  of external rotation.
  - At maturity, range of normal is still from a few  $^\circ$ rees internal to about  $30^\circ$  external.
- Asymmetry less concerning than in hips (often worse on left).

## Foot Shape

- A line bisecting the heel usually passes through 2<sup>nd</sup> toe.
  - Severe adductus has that line passing through 4<sup>th</sup> or 5<sup>th</sup> toe.
- However, almost ALL resolve spontaneously in first year if FLEXIBLE.
- Sometimes, just great toe in adducted (infants) – this resolves, too.

## Intoeing Summary

- Infants: intoeing usually in the foot. Tx VERY rare.
- Toddler: Usually increased tibial version.
  - Vast majority resolve around age 8.
- Child: Usually femoral anteversion.
  - More common in girls.
  - “W” sitting not pathologic.
  - “Severe” beyond 90°.

## Intoeing Summary

- Natural hx of legs is to rotate outwards with growth.
- Fewer than 1% fail to resolve spontaneously, and of those remaining few are symptomatic.
- In those few, osteotomy later in childhood is an effective treatment.
- Orthopaedic devices and posture control have been shown NOT to influence natural history of intoeing.

## More Intoeing Soapbox

- Mild to moderate persistent intoeing as an adult is not harmful and may even be advantageous.
- It has been demonstrated that adults who were forced to wear orthopaedic devices as children have statistically significant decreases in self-image (Driano, Steheli. Psychosocial development and corrective shoewear us in childhood. JPO 18:346. 1998)
- Treating the parent can harm the child!

## However...

- Watch out for asymmetry in the hip (DDH, Perthes, etc)
  - Get bilateral hip films.
- Watch out for the rare rigid foot deformity.
- Since the leg normally turns outward with growth, severe OUTtoeing can get worse.
- Always be suspicious of persistent musculoskeletal PAIN in kids and /or a NEW deformity.

## Genu Varus / Valgus

- As with rotation, there is a normal growth progression.
- Assessment is straightforward
  - Check rotational profile
  - Measure thigh – tibia angle with patellae pointing straight up.
  - Is there joint laxity?
  - Does deformity change with weight bearing?

## Genu Varus / Valgus

- Normals on a curve:
  - Infant: Mean varus  $15^\circ$ , range  $2-30^\circ$ .
  - Mean at neutral around age 1.5.
  - Valgus peaks at 3-4yo around mean of  $-8^\circ$ , range  $-2^\circ$  to  $-13^\circ$ .
  - By around age 11 it has settled to a valgus of about  $-5^\circ$ .

## Alarms

- Asymmetry.
- Progression out of sequence.
- Diet (rickets).
- Associated MSK abnormalities.
- Less than 5<sup>th</sup> percentile height.
- Beyond 2SD of normal.
- Pain.

## Flatfeet

- The *flexible* flatfoot is a common, benign variation of normal.
- Present in nearly all infants, many children, and about 15% of adults.
- Large scale studies of flat feet in military recruits have shown no increase in disability and in fact some possible protection from stress fractures.

## Exam

- The FLEXIBLE flatfoot:
  - Can be dorsiflexed beyond neutral with the knee extended.
  - Re-establishes an arch when non wt bearing, when the big toe is extended, or when standing tip-toe.
  - Assumes a heel varus position on toe raise.
  - Is not painful.
  - Does not show evidence of skin breakdown.

## Flatfeet

- Shoe modifications or custom inserts for asymptomatic flatfeet are:
  - Ineffective
  - Expensive
  - Sometimes a bad experience for the child
- If mild symptoms, suggest a soft, over-the-counter arch support that should be discontinued if the child finds it bothersome.
- Runners may have less soreness with readily available pronation control athletic shoes.

## Funny Looking Feet

- Simple guidelines:
  - Flexible and pain free:
    - Observe, reassure.
    - Put the child's need for a normal childhood ahead of the need to "satisfy" the parents.
  - Not flexible and pain free:
    - Refer
    - If ordering x-rays get weight bearing or simulated weight bearing x-rays.

## Deep Thoughts

- Normalcy is paramount to a child.
- Treat parent concerns with education, not capitulation.
  - Do not treat the parent at the expense of the child.
- Physicians DO have an obligation to manage the resources of the health care system

## Resources

- [nvining@raleighortho.com](mailto:nvining@raleighortho.com)
- [www.POSNA.org](http://www.POSNA.org)
  - “Parent / Patient Information”
- *Fundamentals of Pediatric Orthopaedics*. Lynn T. Steheli. Lippincott Williams and Wilkins.
- [www.global-help.org](http://www.global-help.org)