Pediatric Orthopedics: "To Refer or Not to Refer"

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• No conflict of interest to disclose
Objectives

• Understand the difference between hip clicks, hip instability and indications for hip ultrasound.

• Differentiate between physiological and pathological causes of intoeing, bow legs, knock knees and flatfeet.

• Differentiate between adolescent anterior knee pain and other knee pathologies.
• Understand the difference between hip clicks, hip instability and indications for hip ultrasound.
The Newborn Hip: When to Refer
History

• The 4 “F’s”
History

• First born
• Female (13:1)
• Frank breech (hips flexed, knees extended)
• Family history
Physical Exam

- Baby must be relaxed
- If crying, examine hip later
- Gentle exam
Barlow – dislocate reduced hip
Physical Exam

Ortolani $^+\text{ve}$ – reduce a dislocated hip
Ortolani $^-\text{ve}$ – not able to reduce a dislocated hip
Physical Exam

Click:

• Benign
• Not a “clunk”
• No significance
Physical Exam

Barlow, Ortolani → up to 4 – 6 weeks of age
Click → up to 4 – 6 months of age
Physical Exam

If dislocated hip not picked up by 4 – 6 weeks of age then generally lose Barlow, Ortolani manoeuvre.

↓

Late physical signs of dislocated hip appear, but only by 4 – 5 months of age.
Physical Exam - Late Signs

Decreased hip abduction
Limitation of abduction
Apparent short leg - Galeazzi sign

*asymmetrical thigh folds*
Detect unstable hip (Barlow, Ortolani)

Refer to pediatric orthopedic surgeon
Bottom Line

Hip click – stable exam

Re-examine at 6 weeks of age

+ve click

Hip u/s

+ve

Refer to Pediatric

-ve

Fired

Orthopedic Surgeon

-ve click

Fired
Grey Area

6 weeks to 3 – 4 months

• Too late to detect reducibility (absent Ortolani, Barlow)
• Too early to detect late physical signs (decreased abduction, LLD)
Bottom Line
Grey Area

• If exam does not “feel right”
• Breech or family history

↓

Send for hip ultrasound at 6 - 8 weeks
No Need to Refer

- Hip click
- Extra skin crease/fold

↓

- Provided hip exam is normal
• Differentiate between physiological and pathological causes of intoeing, bow legs, knock knees and flatfeet.
Intoeing Objectives

• Anatomical
• Chonological
• Refer?
Intoeing

(i) Hip/Femur - Femoral Anteversion

(ii) Tibia – Internal Tibial Torsion

(iii) Foot - Metatarsus Adductus or combination
H & P

• Birth history
• Gait
  • Symmetrical
  • Toe walking
  • Run
  • Hop
  • Hip exam
  • Leg exam
  • Foot exam
• Neuro
Femoral Anteversion

- ↑ Hip internal rotation
- ↓ Hip external rotation
- Female
- Age: ~ 3 - 10
Femoral Anteversion

• Most cases of femoral anteversion will remodel by age 10 unless mom and dad still have it
• Cosmetic concern only
• No functional implications in later life!!!
• Therefore, NO treatment
Internal Tibial Torsion

Most common cause of intoeing < 3 yrs of age
Internal Tibial Torsion

• Usually symmetric
• Most cases will remodel by age 4
• May be associated with femoral anteversion
• Cosmetic concern
• No functional implications
Metatarsus Adductus

- 0 – 18 months
- Forefoot pointing in
- Intrauterine fetal position
- Most respond to time, stretching, or casting
- Must differentiate from clubfoot (where hindfoot is malpositioned and foot very stiff)
Metatarsus Adductus

Refer:

• Not flexible
• Very curved lateral border
• Deep medial crease
• < 8 months of age
Intoeing Summary

Refer:

• Very asymmetrical

• Abnormal physical examination
  – ↑Tone
  – Clonus
  – Hyperreflexia

• Foot – Deep medial crease and rigid
Angular Deformities in Children

Bowlegs = Genu Varum
Knock knees = Genu Valgum
• Usually physiological, needs no treatment
• But… do not miss pathological causes
• How to differentiate physiological from pathological angulation in children?
Approach to a Child with Angular Deformity

- Family history
- History of present condition
  - Progression
- Physical examination:
  - General (features of skeletal dysplasia)
Clinical Evaluation

- No evidence of pathological bone disorder
- Age of the child
  - Genu Varum = 1 – 3 years
  - Genu Valgum = 3 – 7 years

*Therefore, it is physiological – you do not need to refer the patient*

- Follow-up appointment
- Clinical photographs
18 months
4½ years old
When should you refer a child with angular deformities?

- Deformities falling outside the age for physiological genu varum and valgum
When should you refer a child with angular deformities?

• Unilateral
When should you refer a child with angular deformities?

- Asymmetrical
When should you refer a child with angular deformities?

- Severe
When should you refer a child with angular deformities?

- Progressive

18 months

4 years old
When should you refer a child with angular deformities?

• Any suspicion of pathological disorder
When should you refer a child with angular deformities?

- Deformities falling outside the age for physiological genu varum and valgum
- Unilateral
- Asymmetrical
- Severe
- Progressive
- Any suspicion of pathological disorder
Flatfeet
Flatfeet

• Most always asymptomatic
• No correlation to back pain
• Major source of concern to parents
Corrective Shoes and Inserts as Treatment for Flexible Flatfoot in Infants and Children*

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Flatfeet

• Rigid vs flexible
• Painful
• Reforms arch with NWB
• ST joint mobility
Different Dx of Painful Rigid Flatfeet

- Tarsal coalition – unilateral or bilateral
  - 8 – 14 years of age
  - Mechanical/no history of trauma
- JRA - bilateral
- Infection - unilateral
- Trauma - unilateral
Refer:

• Painful → flexible or rigid

Do not refer:

• Not painful, even if rigid
• Arch supports
Toe Walking
History

• > 3 years of age
• Perinatal history/development
• Family history
• Timing
• % of time on toes
Physical Exam

• Calf hypertrophy
• Gower sign
• Clonus, hyperreflexia
• Spine
• Squat test
• Ankle DF to be assessed with knee in EXT.

DF = -20°

DF = 0°
• **DDx:**
  – Cerebral palsy
  – Muscular dystrophies
  – Tethered cord syndrome
  – Diastematomyelia
  – Other neuromuscular diseases
  – Autism
TREATMENT:

Any **ANOMALY** on exam **REFER**

- If left untreated, will persist or worsen
- **Modalities:**
  - Physio: Stretching
  - Night braces
  - Serial casts and Botox
  - Surgery
• Differentiate between adolescent anterior knee pain and other knee pathologies.
ADOLESCENT KNEE PAIN

Any red flags?
Knee pain in skeletally immature patient = referred hip pain until proven otherwise
Anterior Knee Pain

HISTORY:

- ♂ 10 – 15 years of age
- Poorly localised
- Usually bilateral
- Grab sign
- associated with prolonged sitting, stairs, + theater sign
- Pseudolocking
- No history of trauma
Anterior Knee Pain

PHYSICAL EXAM:

• Tight hamstrings
Anterior Knee Pain

• X-rays: 4 Views

A/P  Lat  Tunnel

Skyline
Anterior Knee Pain

TREATMENT:
• Physio: hamstring stretching
• Knee brace?
• Reassurance
Anterior Knee Pain

• Osgood-Schlatter
Anterior Knee Pain

- Sinding-Larsen-Johansson
Red Flags

- History of trauma
- Unilateral
- Swelling
- Real locking
- Giving way
- Night pain → fever
Red Flags

PHYSICAL EXAM:

• Limping
• Quadricep atrophy
• Swelling
• Pain along joint line
• Abnormal hip examination
Red Flags

Osteochondritis Dissecans: Femoral Condyle
Moral Of The Story

• Unilateral knee pain should be taken seriously
• Do not be fooled by initial trauma in tumor cases
Thank you!

Website
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