Peds Ortho: What is normal, what is not, and when to refer

Future of Pediatrics
June 10, 2015

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AGENDA

• Definitions
• Lower Extremity Deformity
• Spinal Alignment
• Back Pain
LOWER EXTREMITY ALIGNMENT
DEFINITIONS

coxa = hip

genu = knee

pes = foot

cubitus = elbow
varus
“bow-legged”
apex away from midline

valgus
“knock-knee”
apex toward midline

normal
- Valgus ankle
- Varus humerus
- Varus hip (coxa vara)
- Valgus hip (coxa valga)
Genu varum (bow-legged)

Genu valgum (knock knee)

bow legs and in toeing often together
Normal Limb alignment

- **Varus** (Bow legged)
- **Valgus** (Knock knee)

**NORMAL < 2 yo**
- Physiologic = reassurance, reevaluate @ 2 yo
- Physiologic = reassurance, reevaluate in future

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4 yo $\rightarrow$ abnormal
13 yo → abnormal + pain
Follow-up is essential!
Intoeing

1. Femoral anteversion
2. Tibial torsion
3. Metatarsus adductus

MOST LIKELY PHYSIOLOGIC AND WILL RESOLVE!

BRACES ARE HISTORY!
Femoral Anteversion

Knee caps point in

Internal rotation >> External rotation

“W” sitters

Most likely physiologic and may resolve!
Internal Tibial Torsion

Foot is rotated inward

Thigh foot angle

MOST LIKELY PHYSIOLOGIC AND WILL RESOLVE BY SCHOOL AGE
Internal Tibial Torsion

(Fuchs 1996)
Metatarsus Adductus

- Flexible = correctible
- Observe vs. casting

CURVED LATERAL BORDER

NOT TO BE CONFUSED WITH...

toes point in

NORMAL  MILD  MODERATE  SEVERE
Clubfoot  talipes equinovarus

- internal rotation
- varus
- equinus
- can’t dorsiflex
- cavus
- adductus
Clubfoot

START CASTING JUST AFTER BIRTH
Calcaneovalgus Foot

- Intrauterine positioning
- Resolve 1-2 months
- Cast if not
- Look for tibial bowing
Tibial Bowing

1. Anterolateral $\rightarrow$ congenital pseudarthrosis (NF-1)
2. Posteromedial $\rightarrow$ benign
3. Anterior (+/- medial) $\rightarrow$ fibula hemimelia
Anterolateral Tibial Bowing

- Neurofibromatosis type 1
  - Brace to avoid fracture
  - Surgery for fracture
Posteromedial Tibial Bowing

- Calcaneovalgus foot and LLD
  - Foot deformity will improve
  - Leg length discrepancy will need treatment
Anterior Tibial Bowing

• Fibular deficiency
  • Reconstruction of leg or amputation depending on foot and length of leg
Flatfoot = pes planus

collapsed arch

heel valgus
Flatfoot = pes planus

Rigid flatfoot
ABNORMAL
- +/- pain
- Tarsal coalition
- Neuromuscular

Flexible flatfoot
NORMAL
NO TREATMENT
IF PAINFUL
- stretching
- inserts

arch not restored + no heel motion = not flexible
restored arch + heel motion = flexible
Toe Walking

• CP/spasticity
  • Delayed walkers
  • Abnl reflexes
• Muscular dystrophy
  • Potentially 1st sign
• LLD
  • Unilateral
• Idiopathic
  • Normal neuro exam
  • Behavioral -> able to walk flat foot
  • Short Achilles -> obs. vs. splint/cast vs. surgery
Toe Walking

• Stricker et al
  • Surgery: 100% with improved ankle ROM
  • Observation: 17% improved ankle ROM
  • Casting: 24% improved ankle ROM
  • 67% parent satisfaction with surgery
  • 25% parent satisfaction with casting or observation

• Eastwood et al
  • Achilles lengthening: 72% improved or normal gait at follow up
  • Observation or casting: 51% improved or normal gait

Botox has not been shown to improve outcome of idiopathic toe walking
Immature gait

- Wider base
- Shorter steps
- More steps/min

Delayed walking?
Frequent falls?
Walks funny?
SPINAL ALIGNMENT
Scoliosis
Scoliosis
Radiographic Technique

- Full length
- Entire spine
- Include pelvis
- PA (protect breast tissue)
- Standing!!
- Lateral View
Radiographic Technique

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- Lateral View

59% x-rays
74% brought
25% repeated
20° curve
oblique pelvis

pelvis leveled w/ 2 cm block
minimal asymmetry
20° curve
7 yo, premenarchal immature on x-ray

≠

25° curve
14 yo, 2 years postmenarchal mature on x-ray
Who needs referral?

- Scoliometer >7°
- Cobb Angle >20°

Reexamine others in 4-6 months if still growing
Determining who needs treatment

1. Size of curve
2. Amount of growth remaining (menarchal status, Risser, bone age)
NATURAL HISTORY

Size + Age
• Immature
• >25°

At maturity
• <30° → progression rare
• >50° → progression common
  approx. 1°/year

(Weinstein 1983)
GOALS:
1. Stop progression
2. Avoid surgery

DAY BRACES:
22 hours/day

Indications
Growing patients (Risser 0,1,2)
Curves 25° – 45°
Willing to wear the brace

Charleston (night): lumbar or T/L curves <35°
WATCH OUT FOR.....
BACK PAIN
Back Pain

• Common (LBP)
  – Etiology unknown 85%
• History/neuro exam
  – Fevers
  – Night pain
  – Worsening
  – Decreased motion
  – Hamstrings!!!
• Not d/t scoliosis

Musculoligamentous
Spondylolysis
Spondylolithesis
Scheuermann’s
Infectious (diskitis, osteo)
Neoplasm
Rheumatologic
Back Pain

- X-rays often normal
  - AP & lateral

- PT!!
  - Hamstring stretching
  - Core strengthening

- NSAIDs prn

- MRI/bone scan for persistent pain
THANK YOU!!

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