

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

Future of Pediatrics
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AGENDA

- Definitions
- Lower Extremity Deformity
- Spinal Alignment
- Back Pain

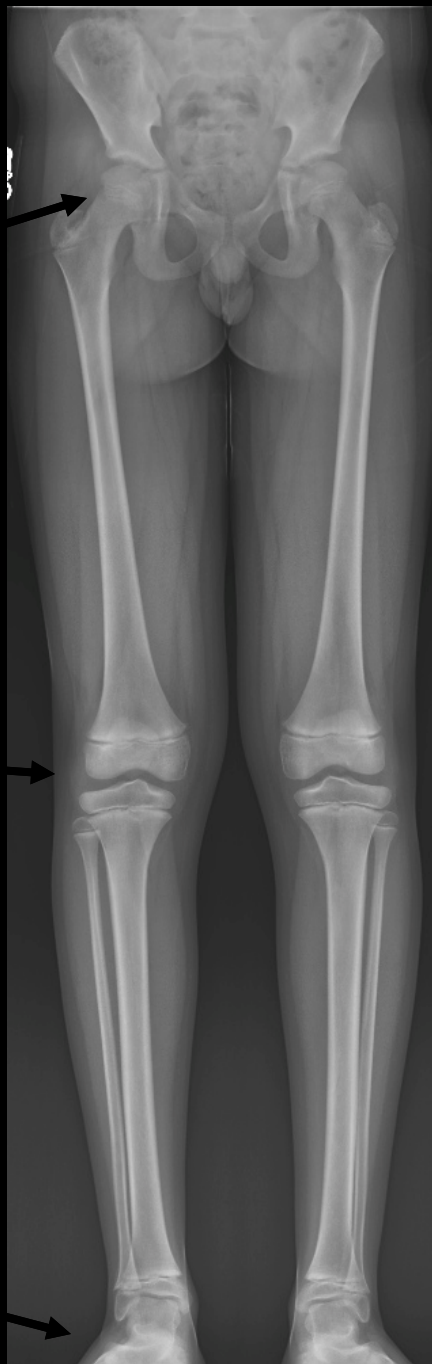
LOWER EXTREMITY ALIGNMENT

DEFINITIONS

coxa = hip

genu = knee

pes = foot



cubitus = elbow

varus
“bow-legged”
apex away from midline



normal

valgus
“knock-knee”
apex toward midline





valgus ankle



varus humerus



varus hip (coxa vara)



valgus hip (coxa valga)

XR, f



Genu varum (bow-legged)



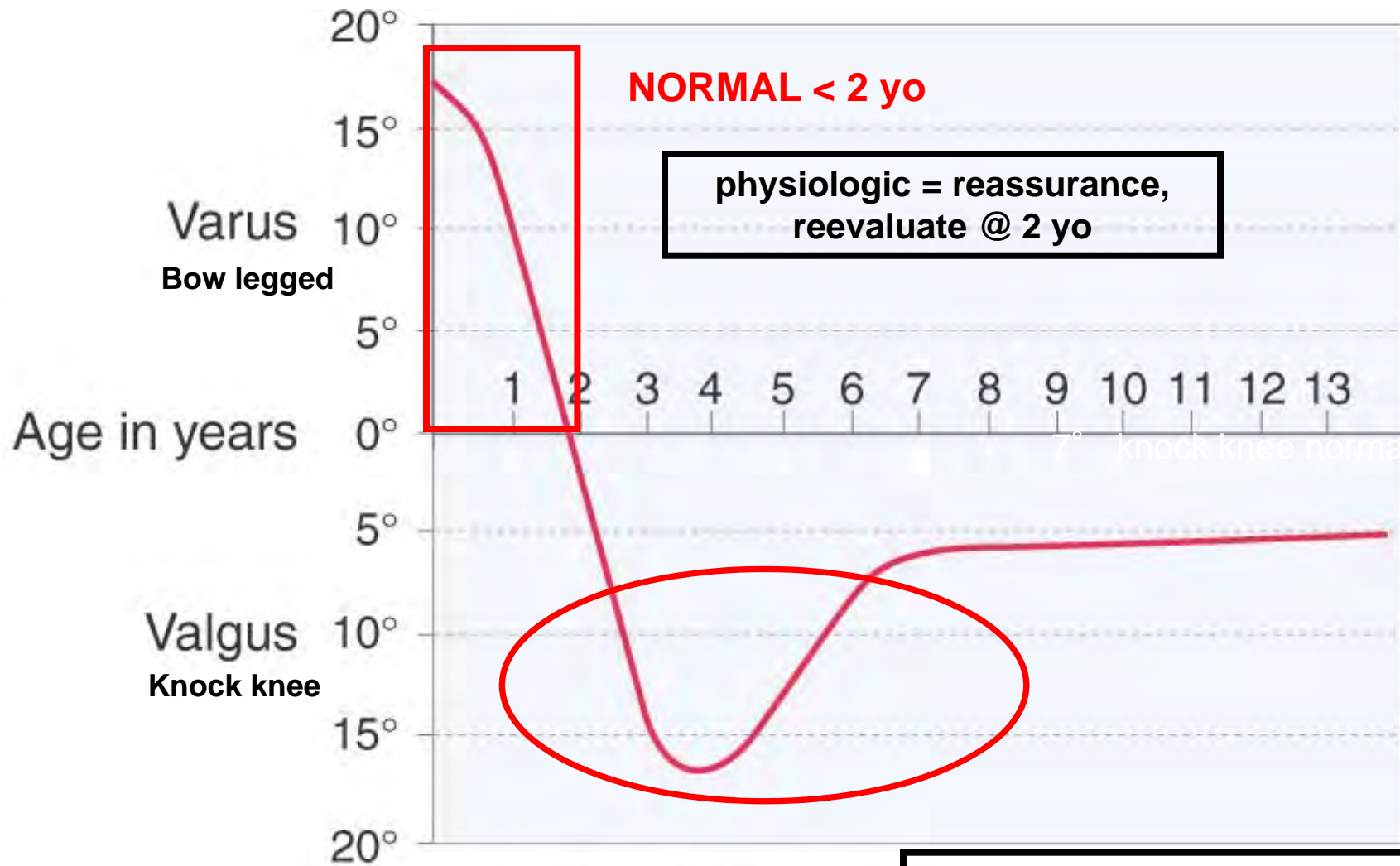
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bow legs and in toeing often together

Genu valgum (knock knee)



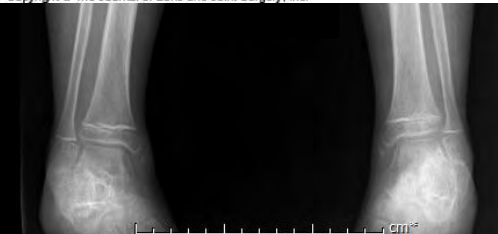
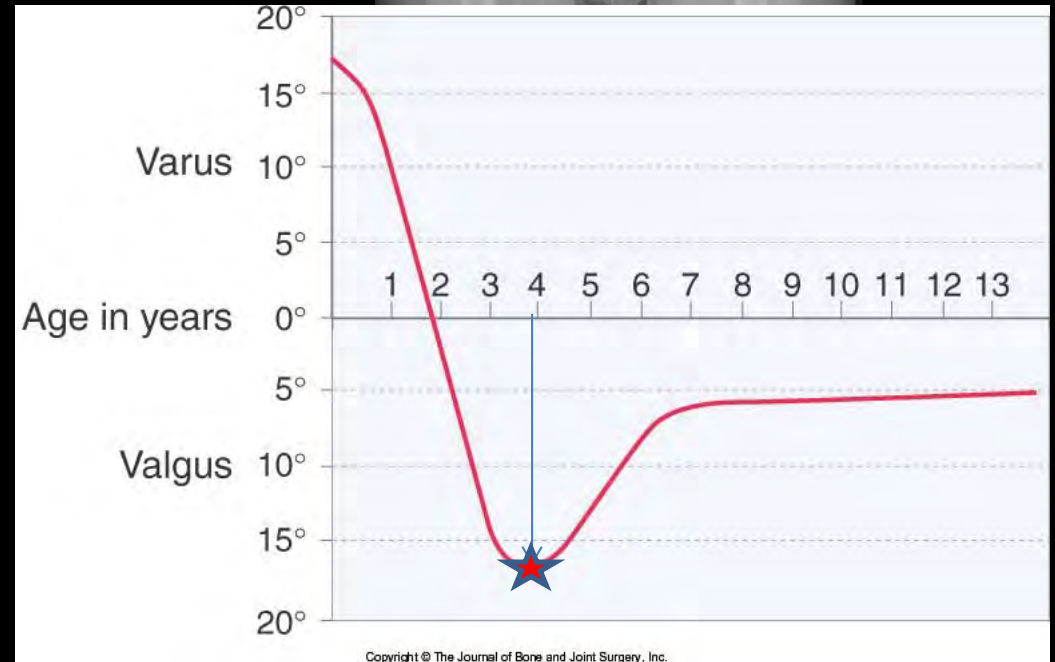
Normal Limb alignment



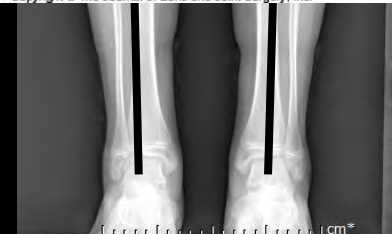
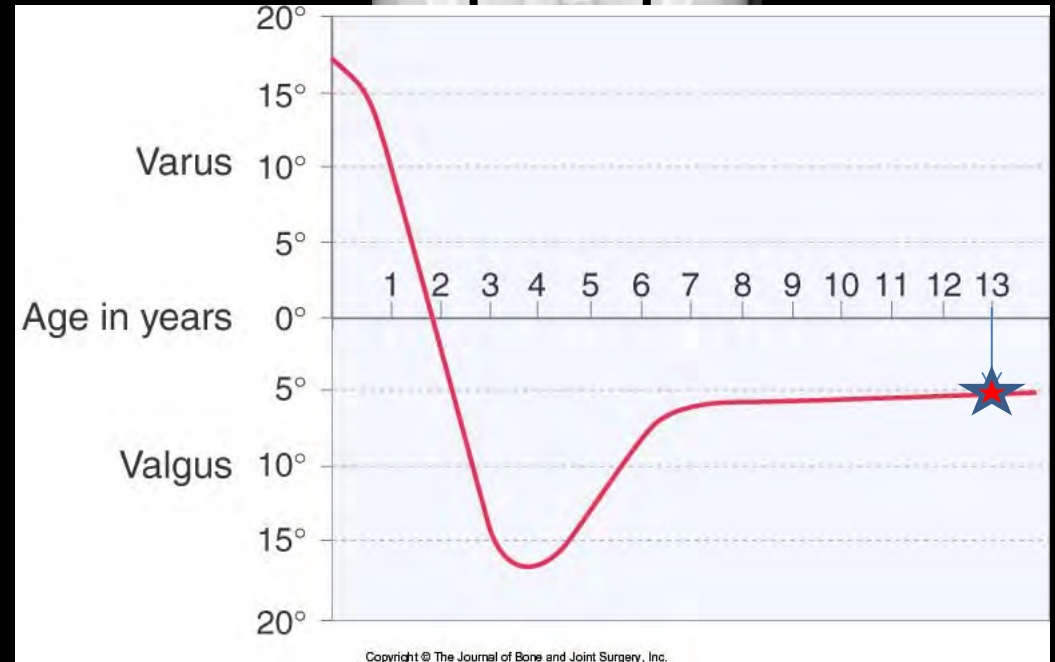
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**physiologic = reassurance,
reevaluate in future**

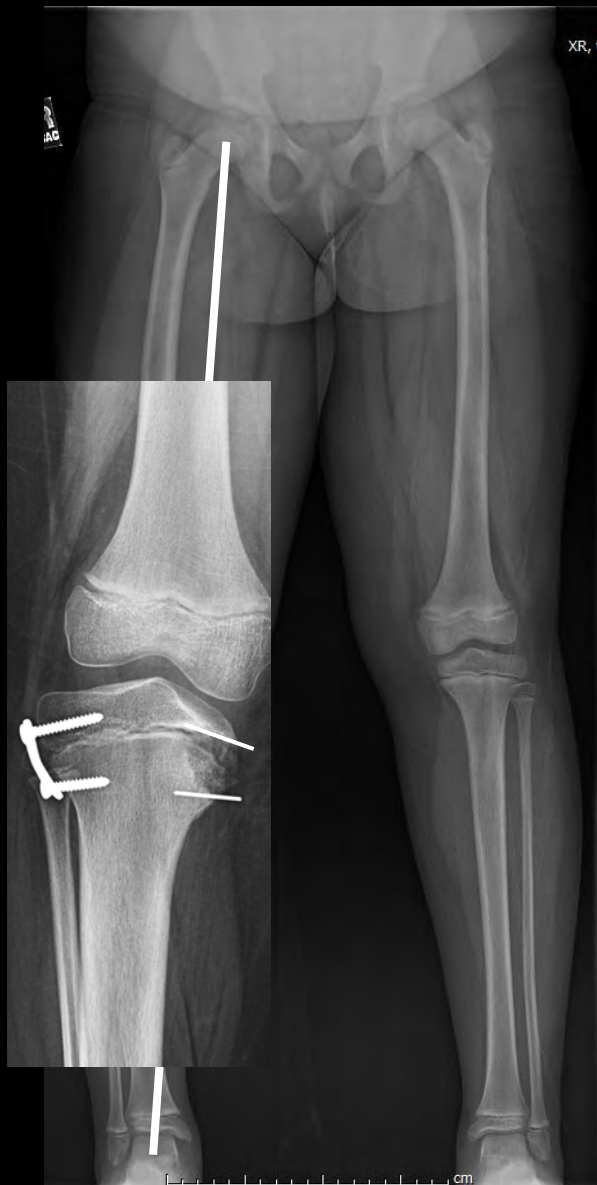
4 yo → abnormal



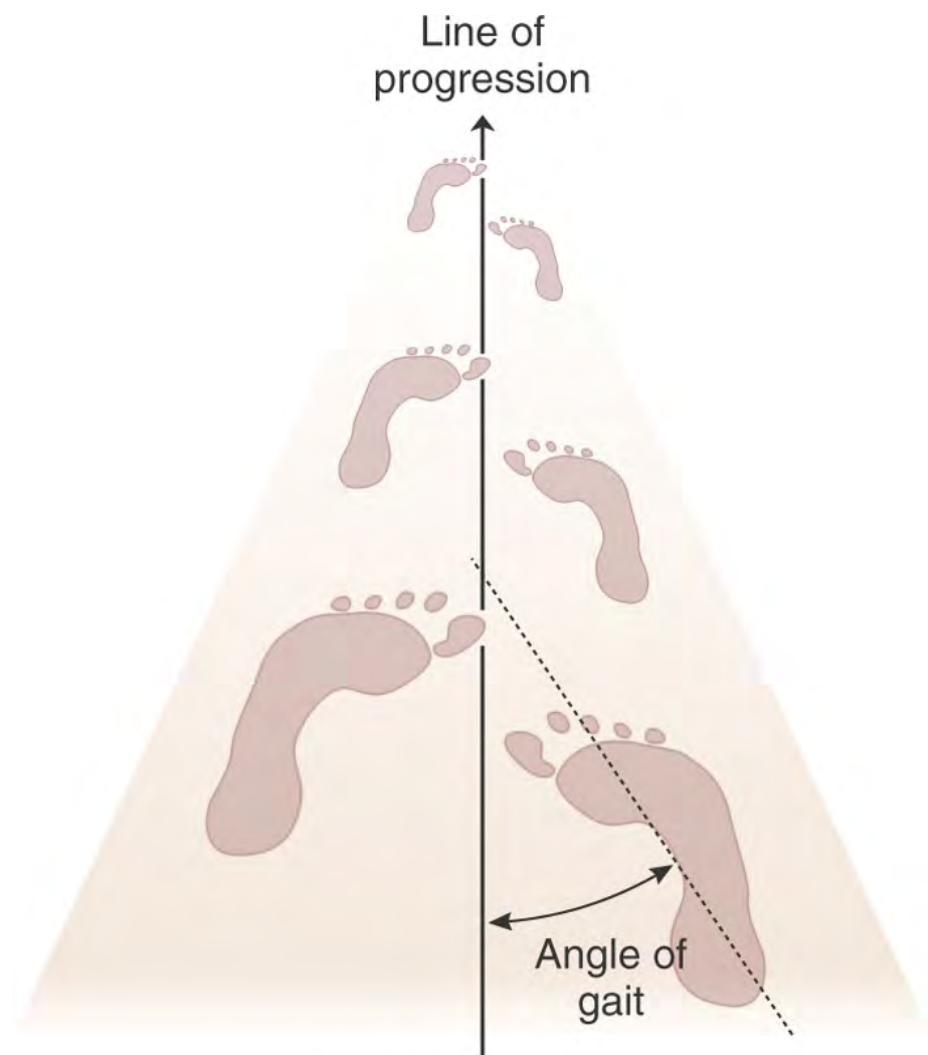
13 yo → abnormal + pain



Follow-up is essential!



Intoeing

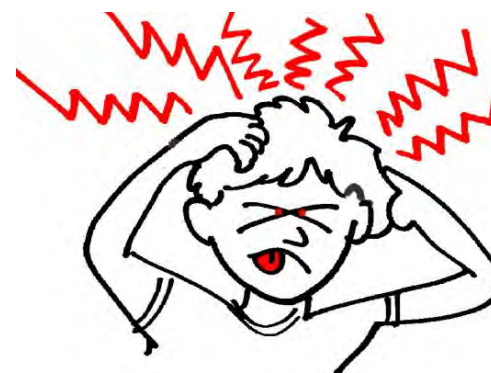


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1. Femoral anteversion
2. Tibial torsion
3. Metatarsus adductus

**MOST LIKELY PHYSIOLOGIC
AND WILL RESOLVE!**

BRACES ARE HISTORY!



Femoral Anteversion



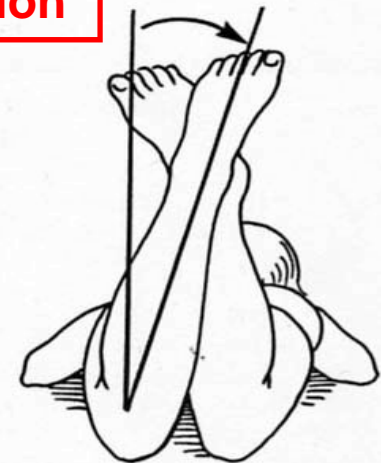
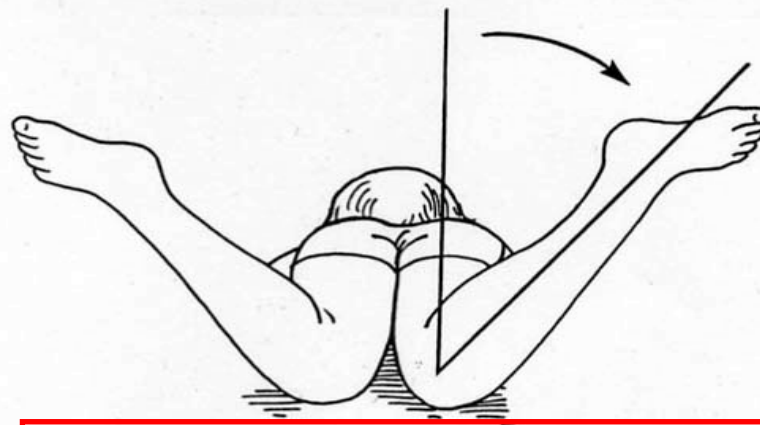
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knee caps point in



"W" sitters

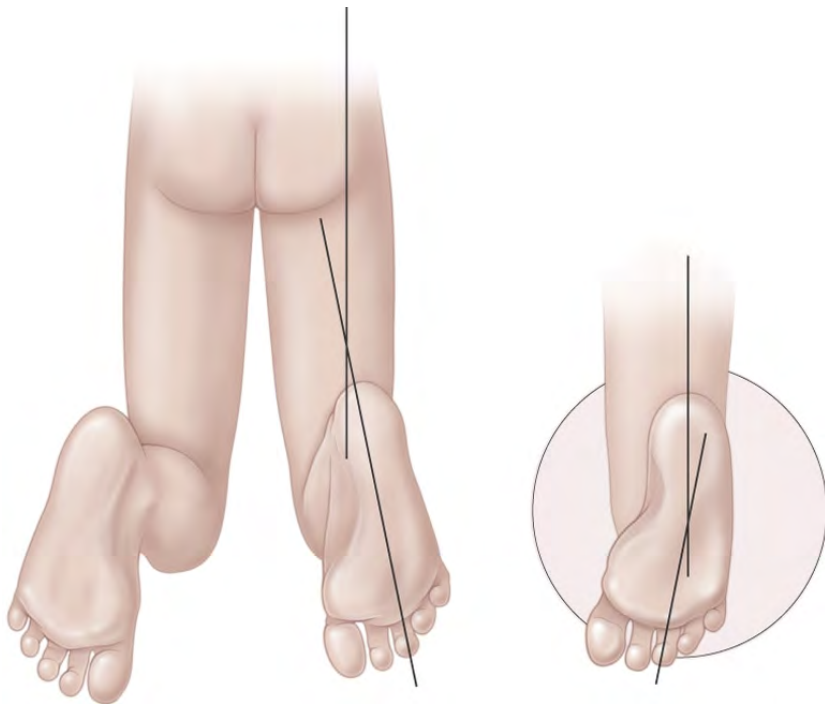
Internal rotation >> External rotation



MOST LIKELY PHYSIOLOGIC AND MAY RESOLVE!

Internal Tibial Torsion

Thigh foot angle

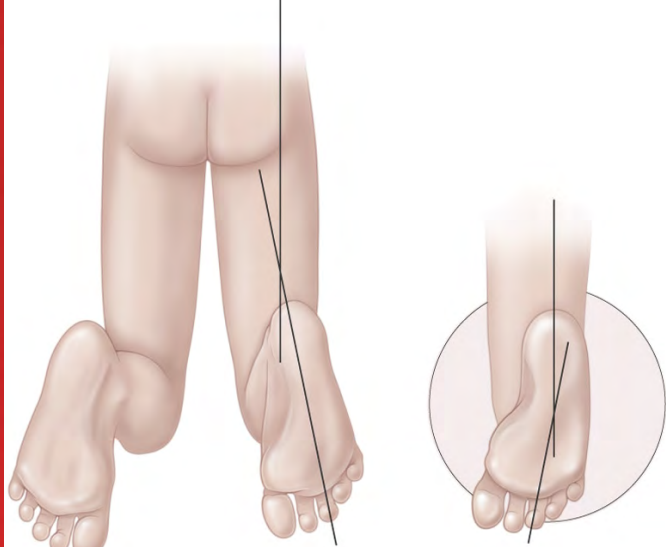
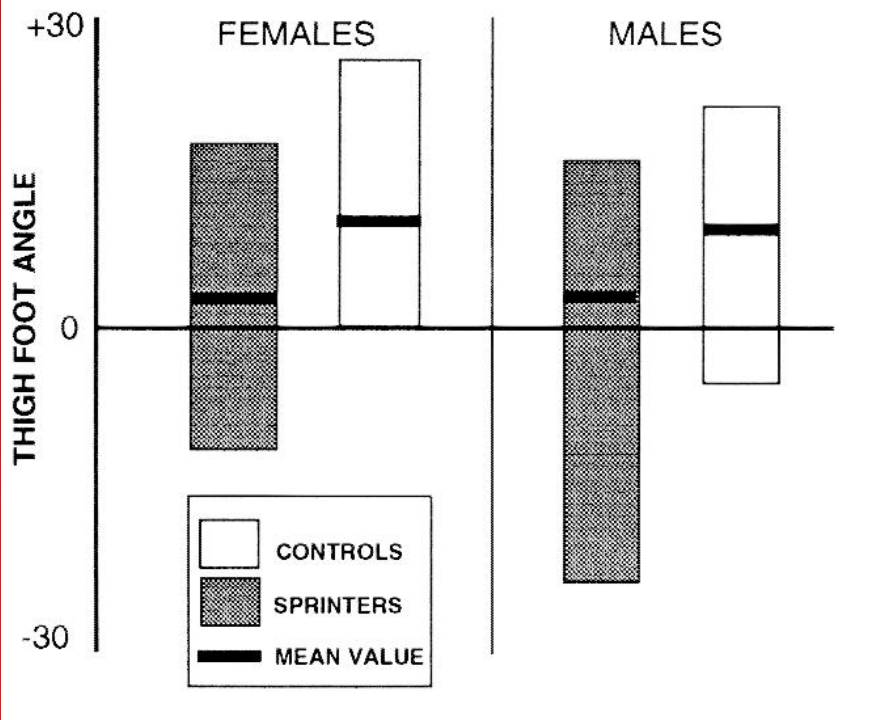


Foot is rotated inward



**MOST LIKELY PHYSIOLOGIC
AND WILL RESOLVE BY
SCHOOL AGE**

Internal Tibial Torsion



(Fuchs 1996)



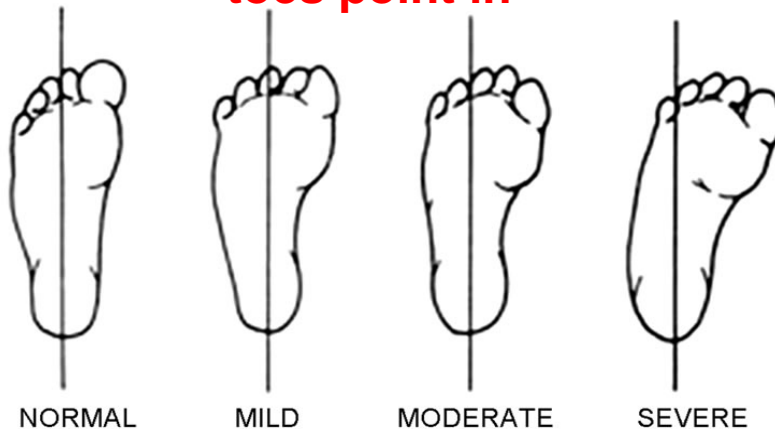
Metatarsus Adductus



- Flexible = correctible
- Observe vs. casting

CURVED LATERAL BORDER

toes point in



**NOT TO BE
CONFUSED WITH...**

Clubfoot talipes equinovarus



internal rotation



varus



adductus



equinus



cavus

CAN'T DORSIFLEX

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 → congenital pseudarthrosis (NF-1)
2. Posteromedial → benign
3. Anterior (+/- medial) → fibula hemimelia

Anterolateral Tibial Bowing



- **Neurofibromatosis type 1**
 - **Brace to avoid fracture**
 - **Surgery for fracture**

Posteromedial Tibial Bowing



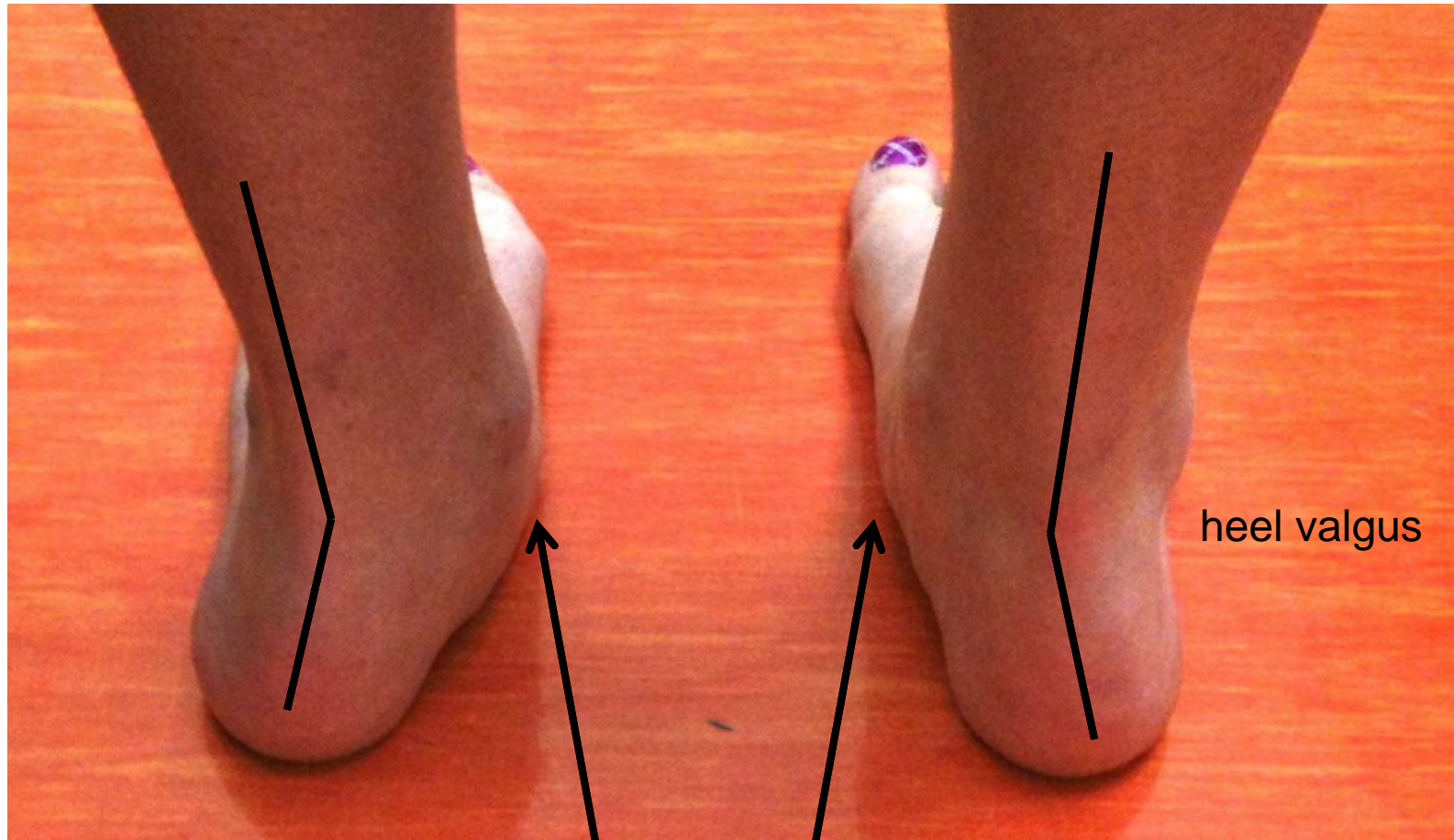
- **Calcaneovalgus foot and LLD**
 - **Foot deformity will improve**
 - **Leg length discrepancy will need treatment**

Anterior Tibial Bowing



- **Fibular deficiency**
 - Reconstruction of leg or amputation depending on foot and length of leg

Flatfoot = pes planus



collapsed arch

heel valgus

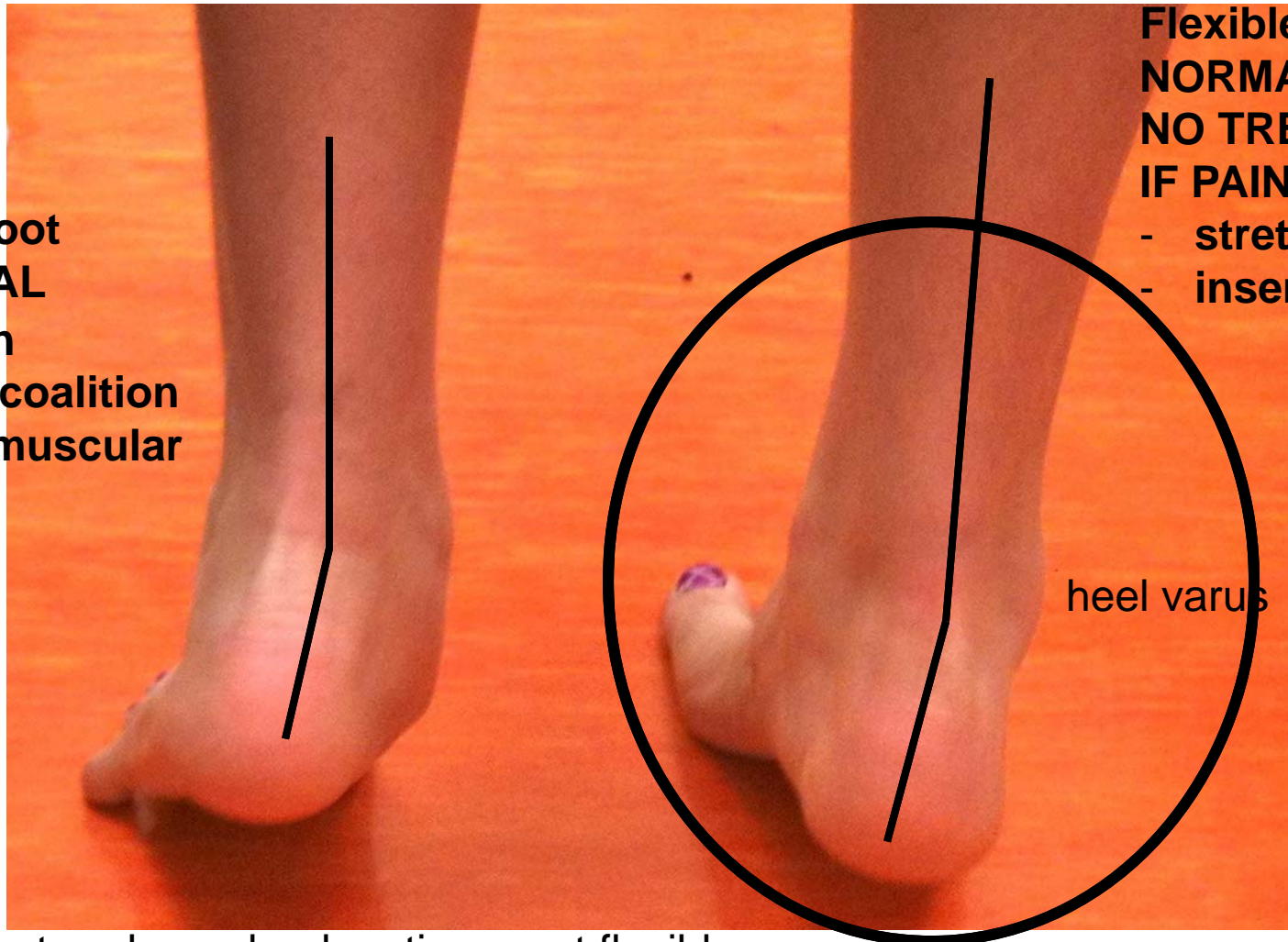
Flatfoot = pes planus

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



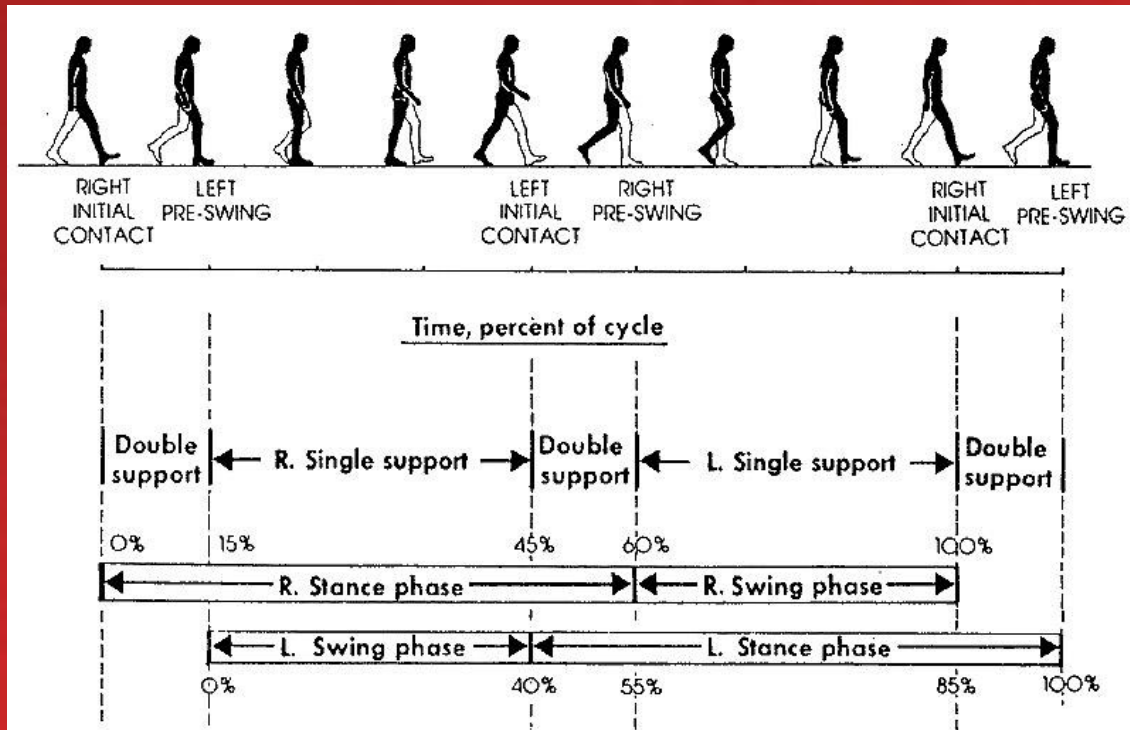
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Toe Walking

- 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

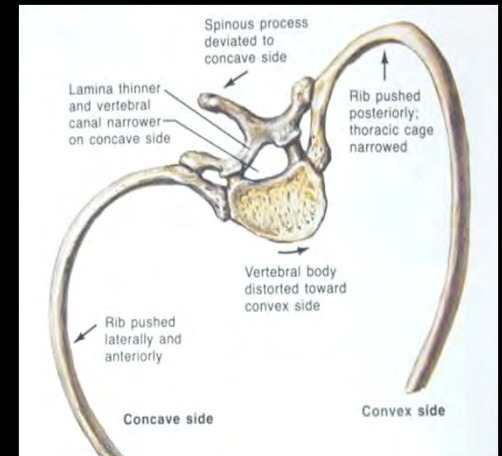
Delayed walking?
Frequent falls?
Walks funny?

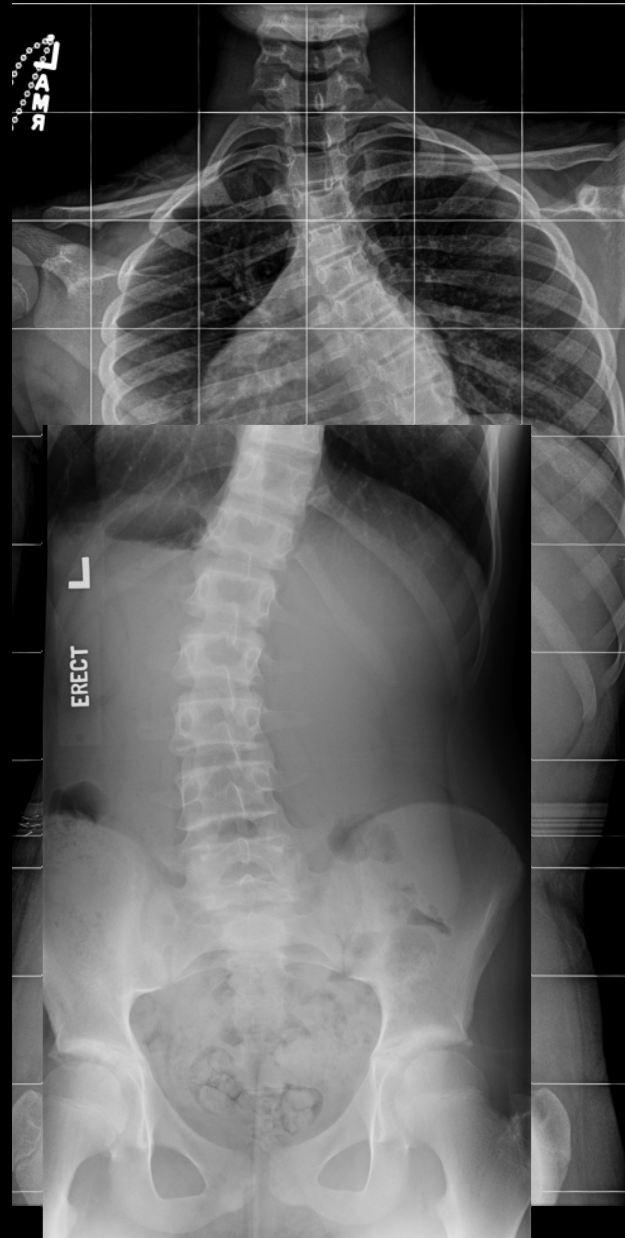
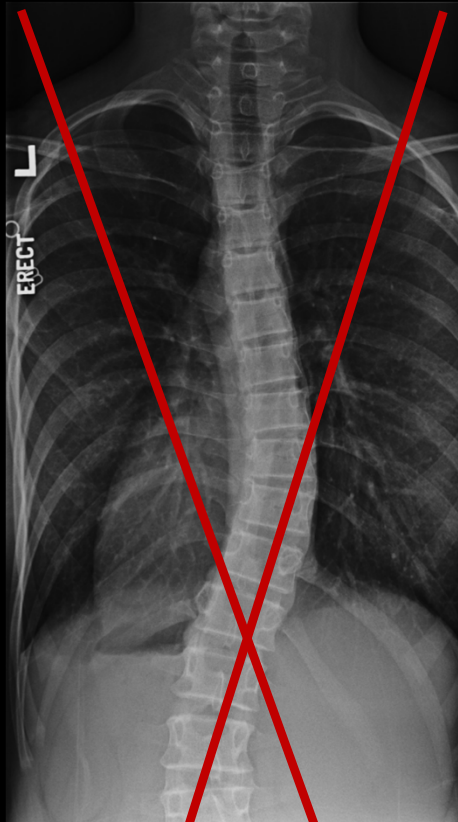
SPINAL ALIGNMENT

Scoliosis



Scoliosis

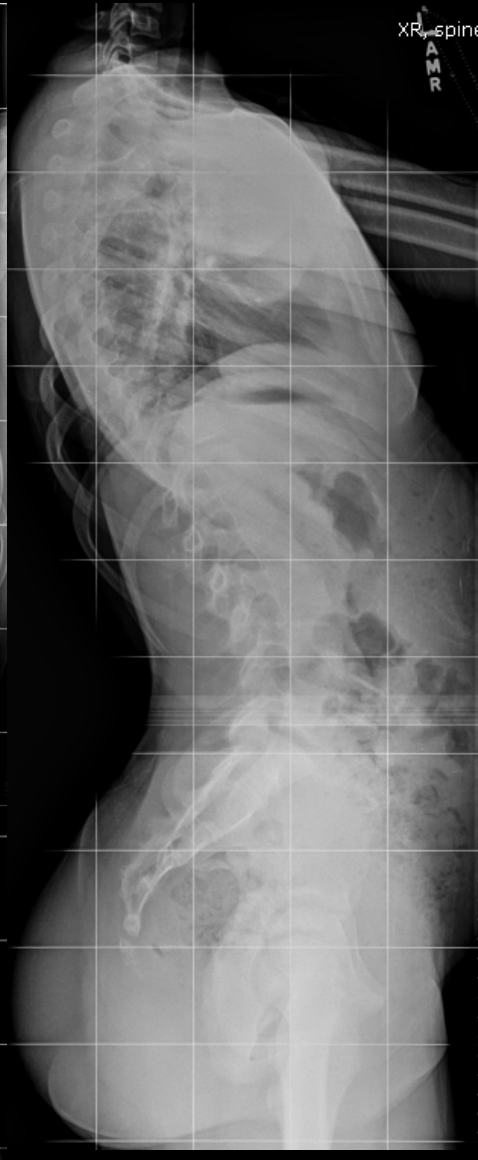
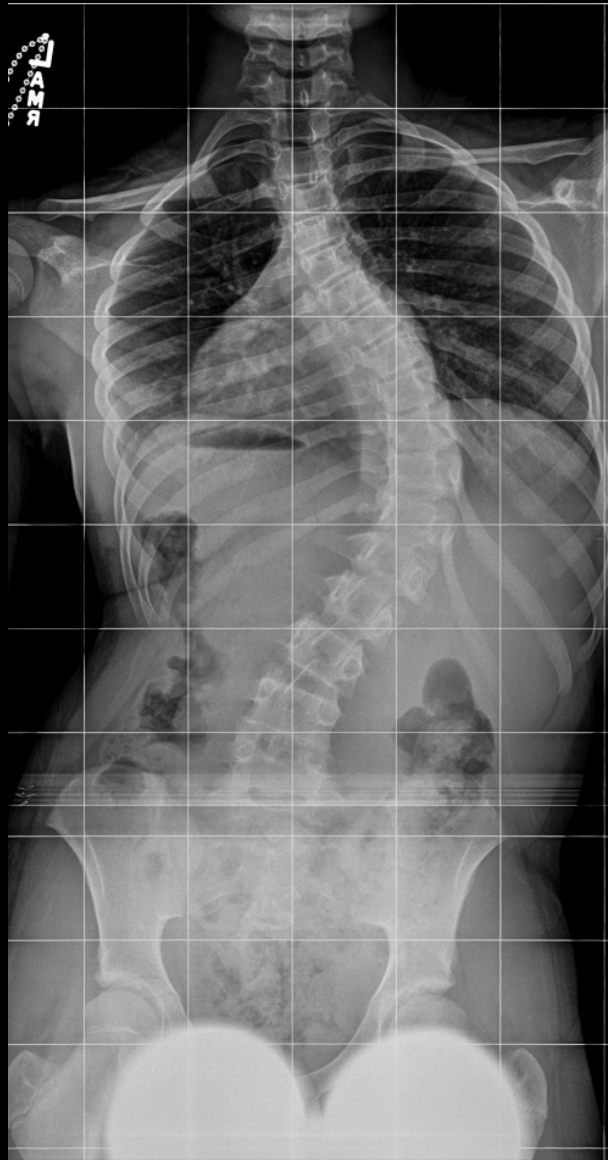




Radiographic Technique

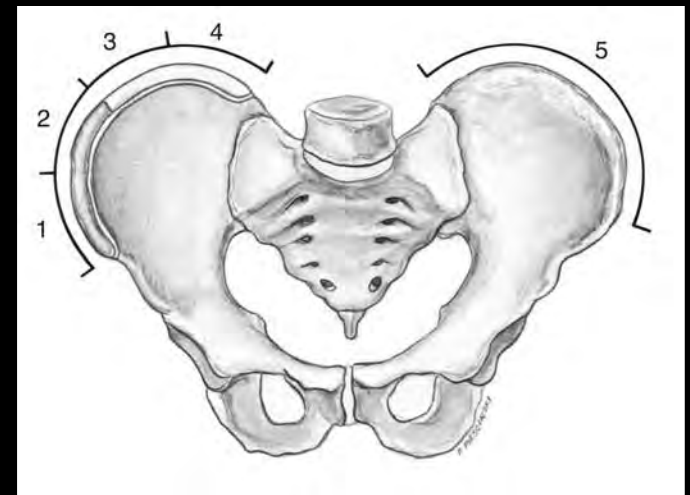
- Full length
 - Entire spine
 - Include pelvis
 - PA (protect breast tissue)
- Standing!!
- Lateral View

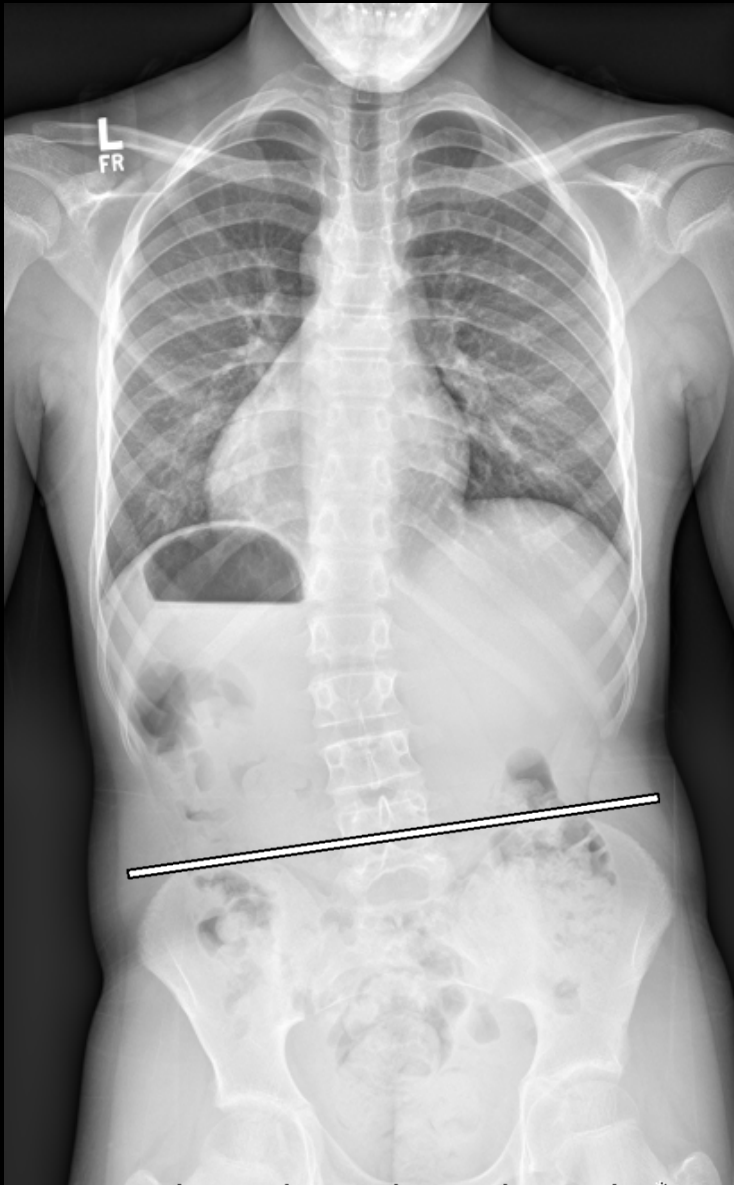
59% x-rays
74% brought
25% repeated



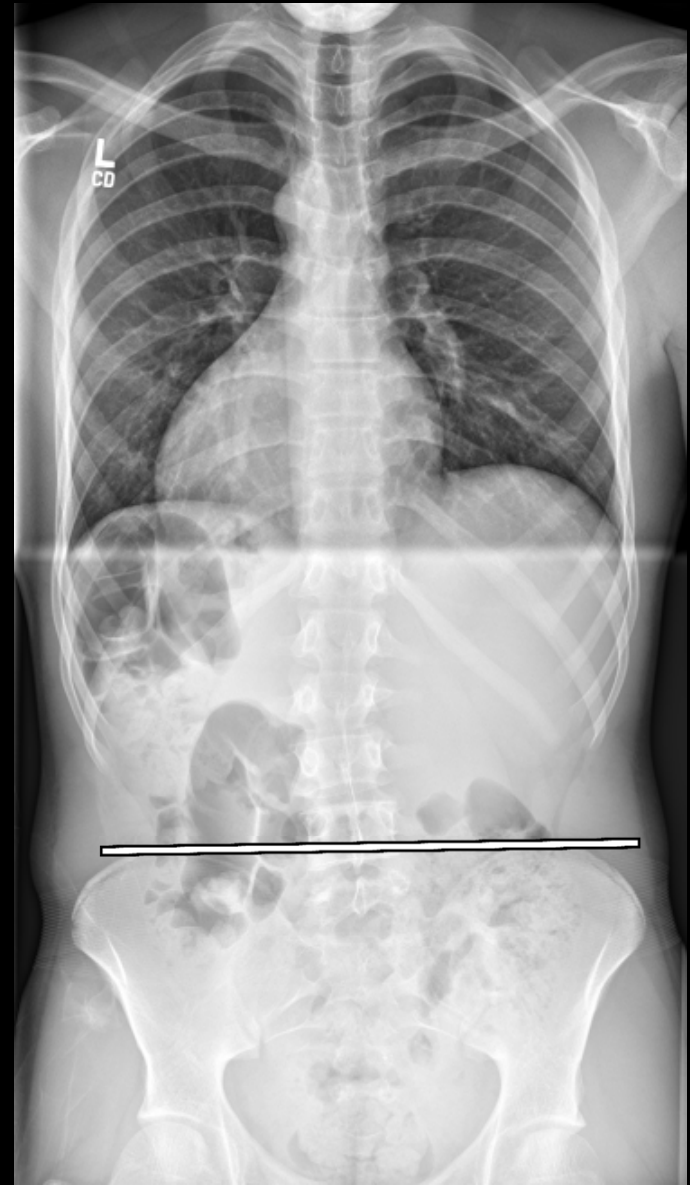
Radiographic Technique

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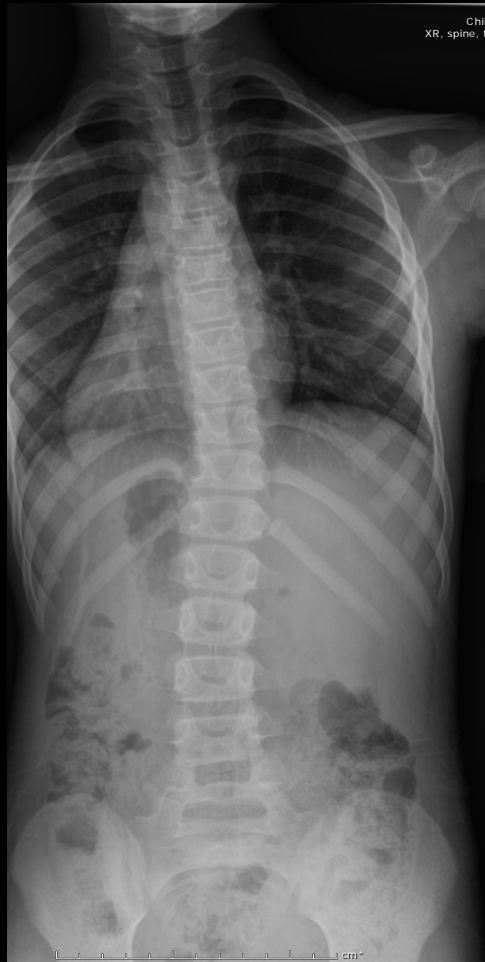




20° curve
oblique pelvis



pelvis leveled w/ 2 cm
block
minimal asymmetry



20° curve
7 yo, premenarchal
immature on x-ray

≠

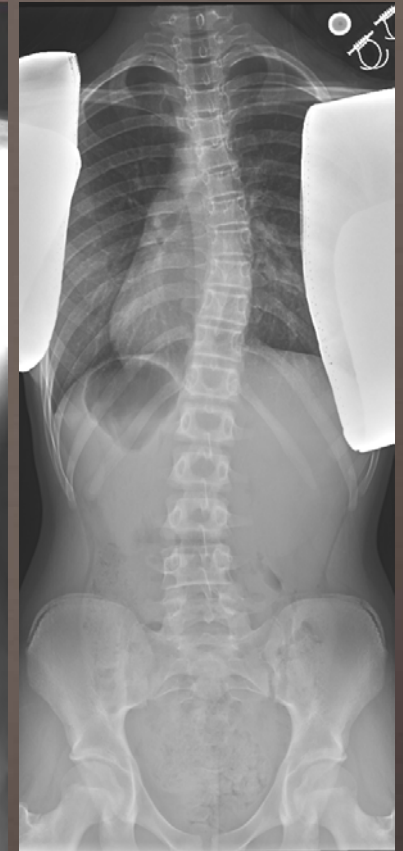
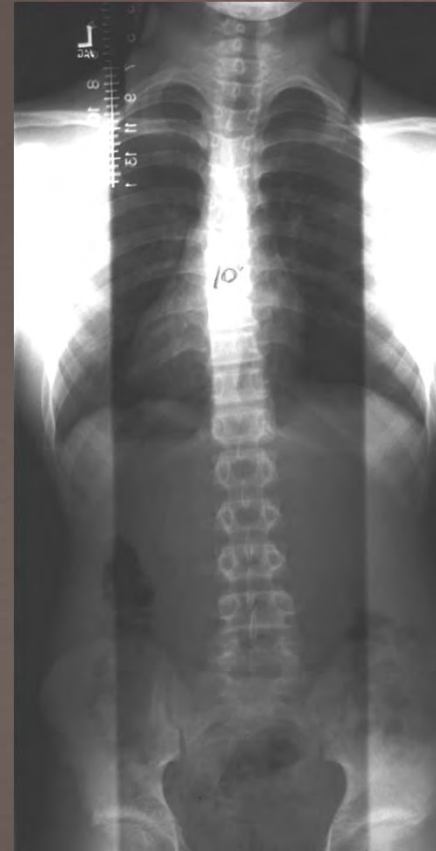
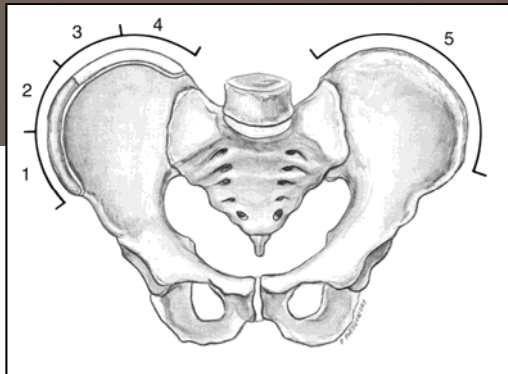


25° curve
14 yo, 2 years postmenarchal
mature on x-ray

Who needs referral?



Scoliometer $>7^{\circ}$

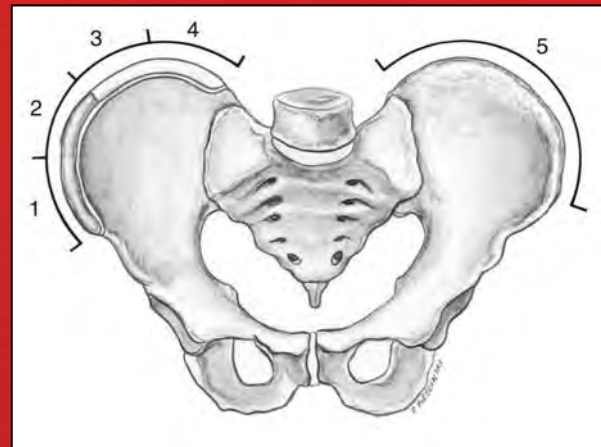
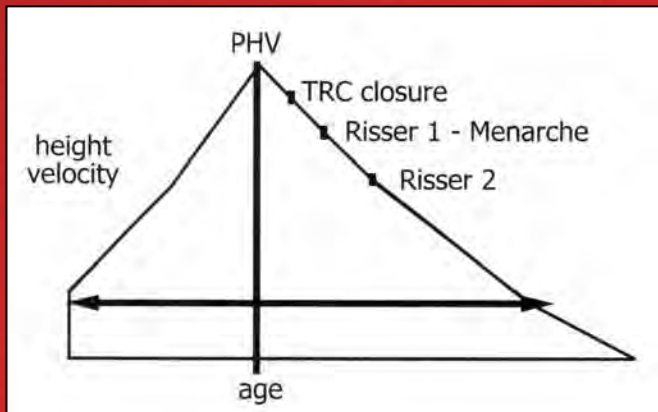


Cobb Angle $>20^{\circ}$

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)



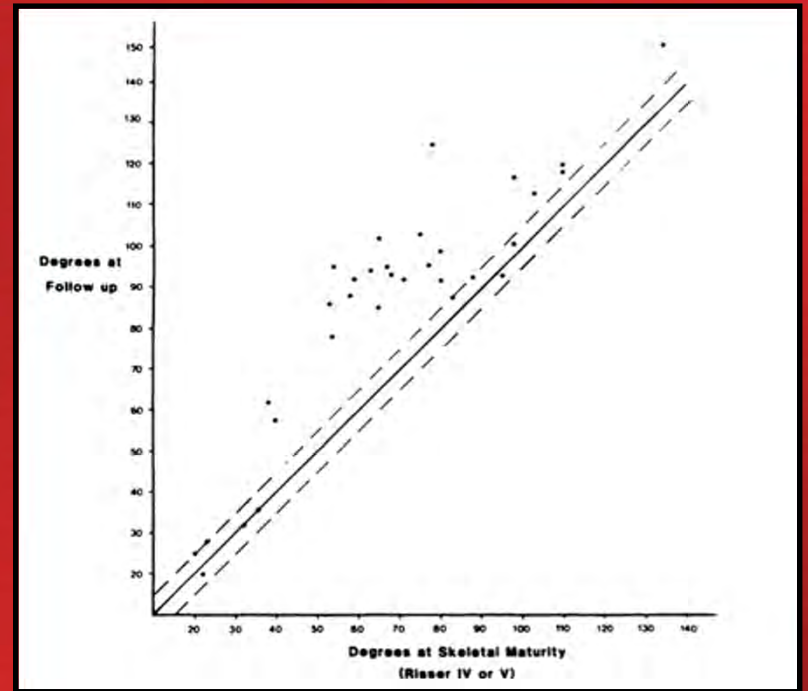
NATURAL HISTORY

Size + Age

- Immature
- $>25^\circ$

At maturity

- $<30^\circ$ → progression rare
- $>50^\circ$ → progression common
approx. 1° /year



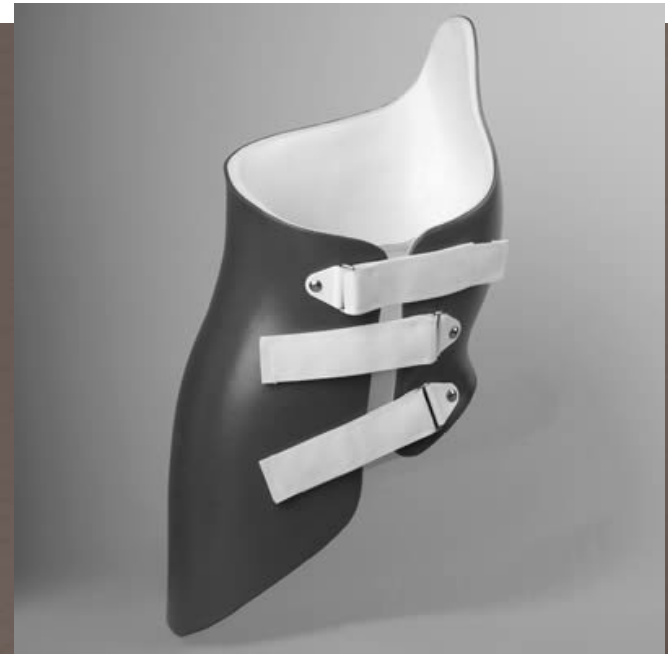
(Weinstein 1983)



Boston



Rigo-Cheneau



Providence (night)

GOALS:

1. Stop progression
2. Avoid surgery

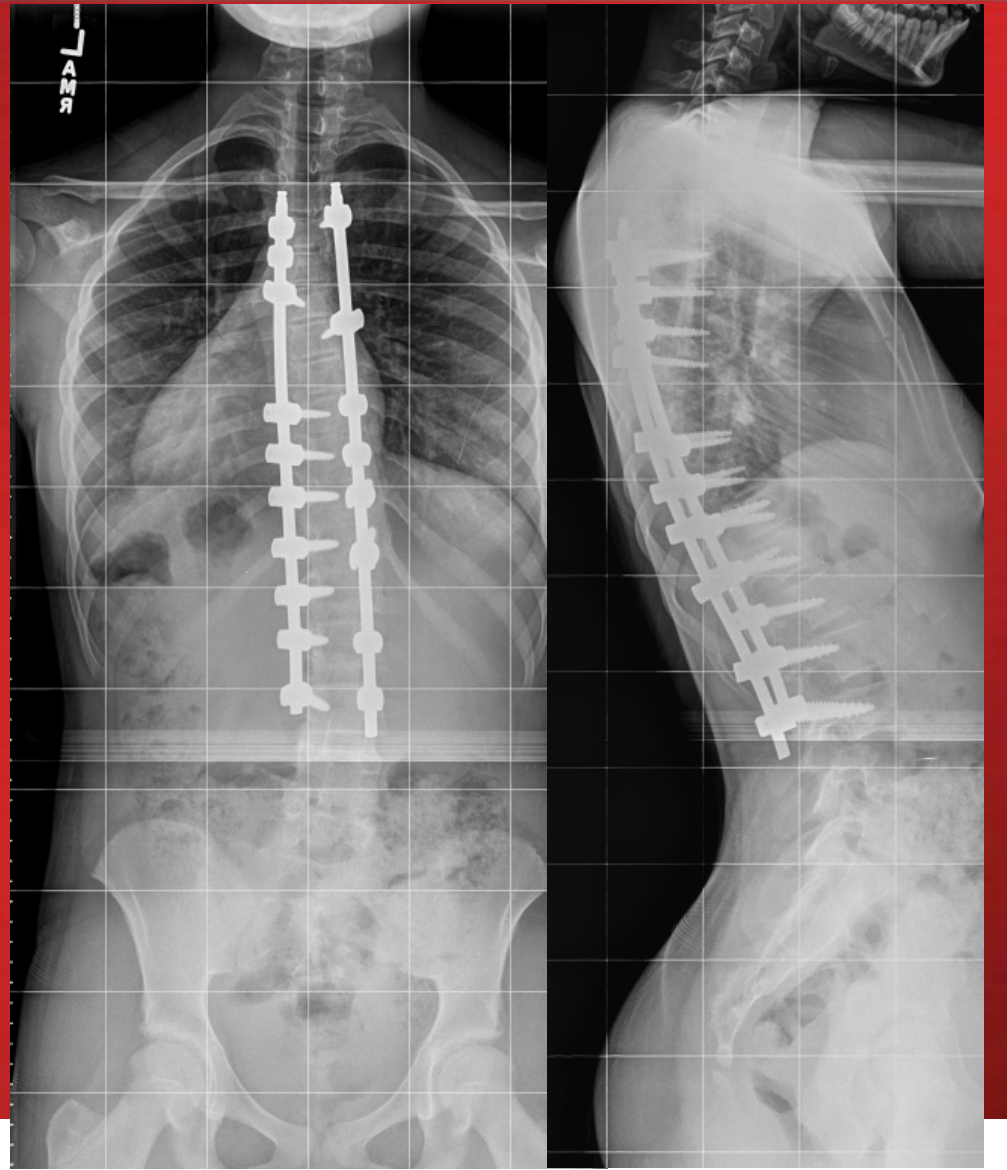
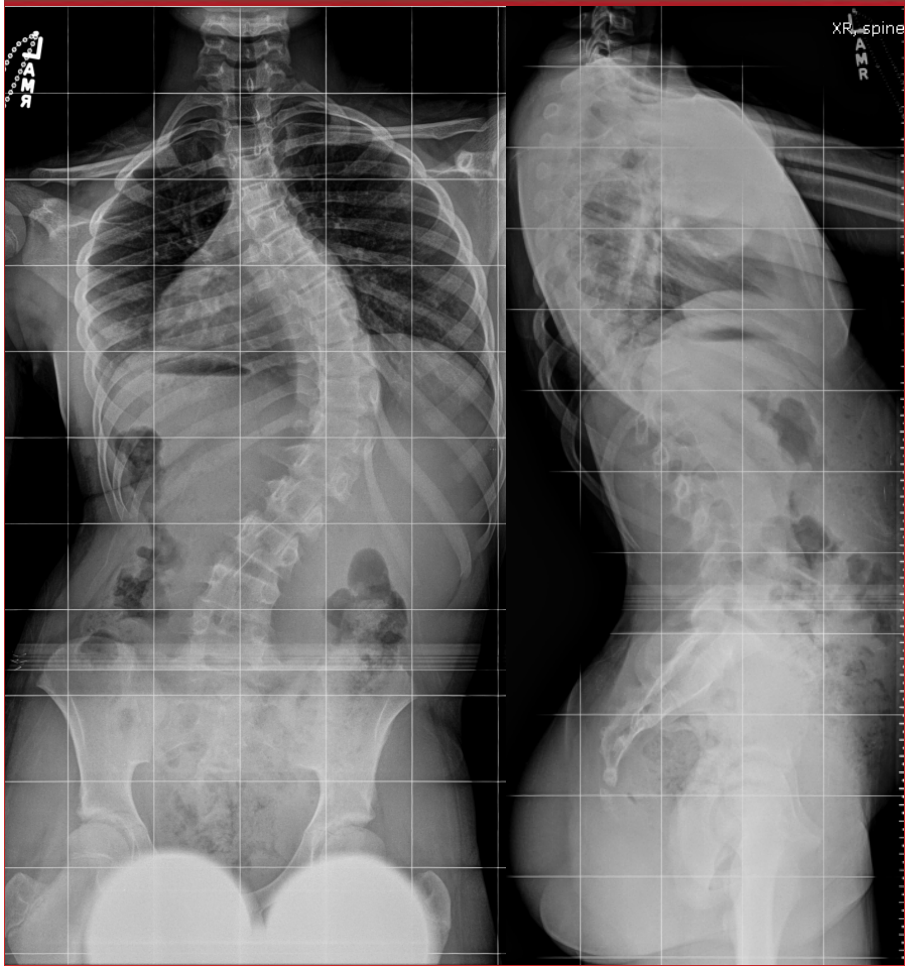
DAY BRACES:
22 hours/day

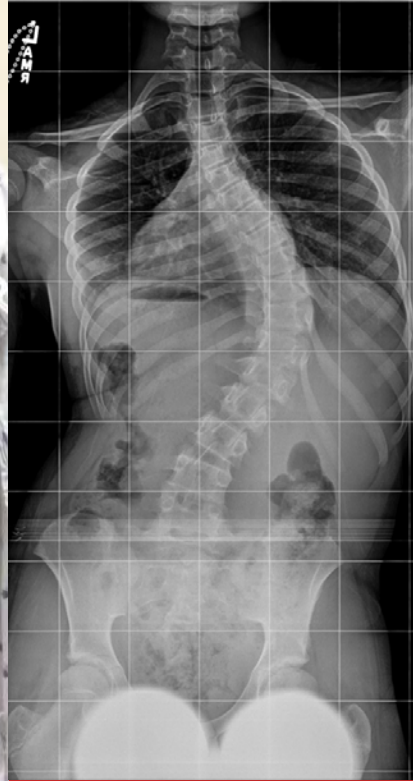
Indications

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



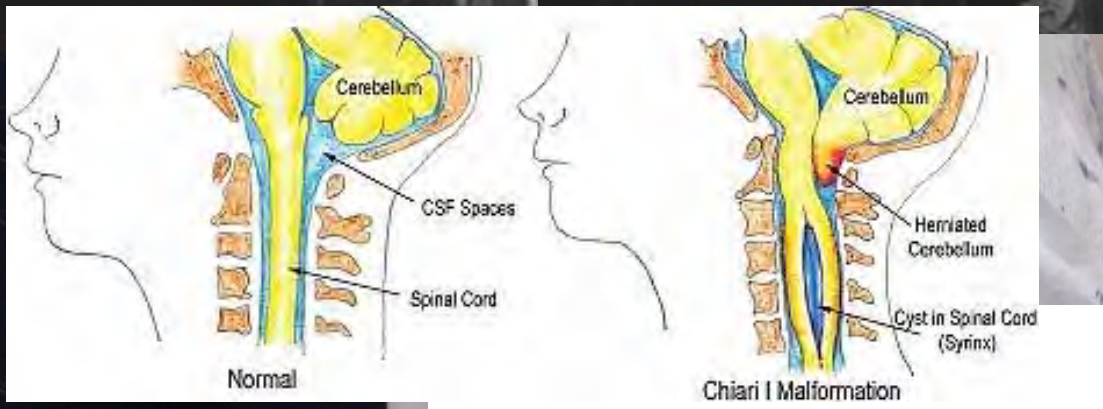
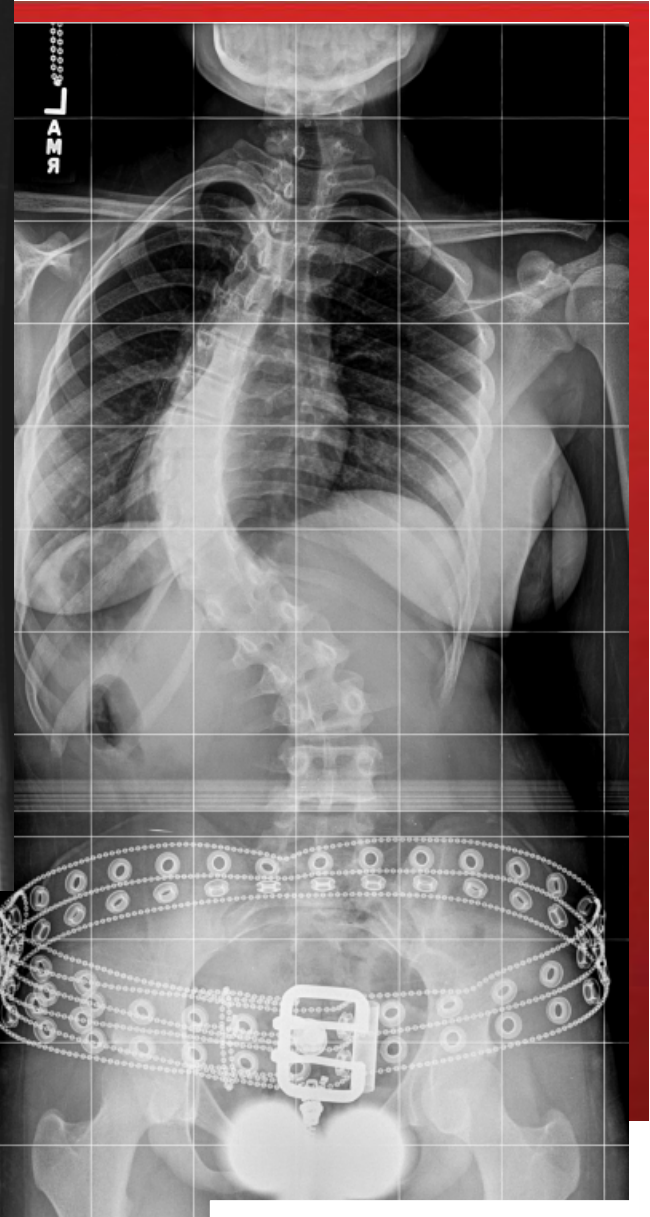
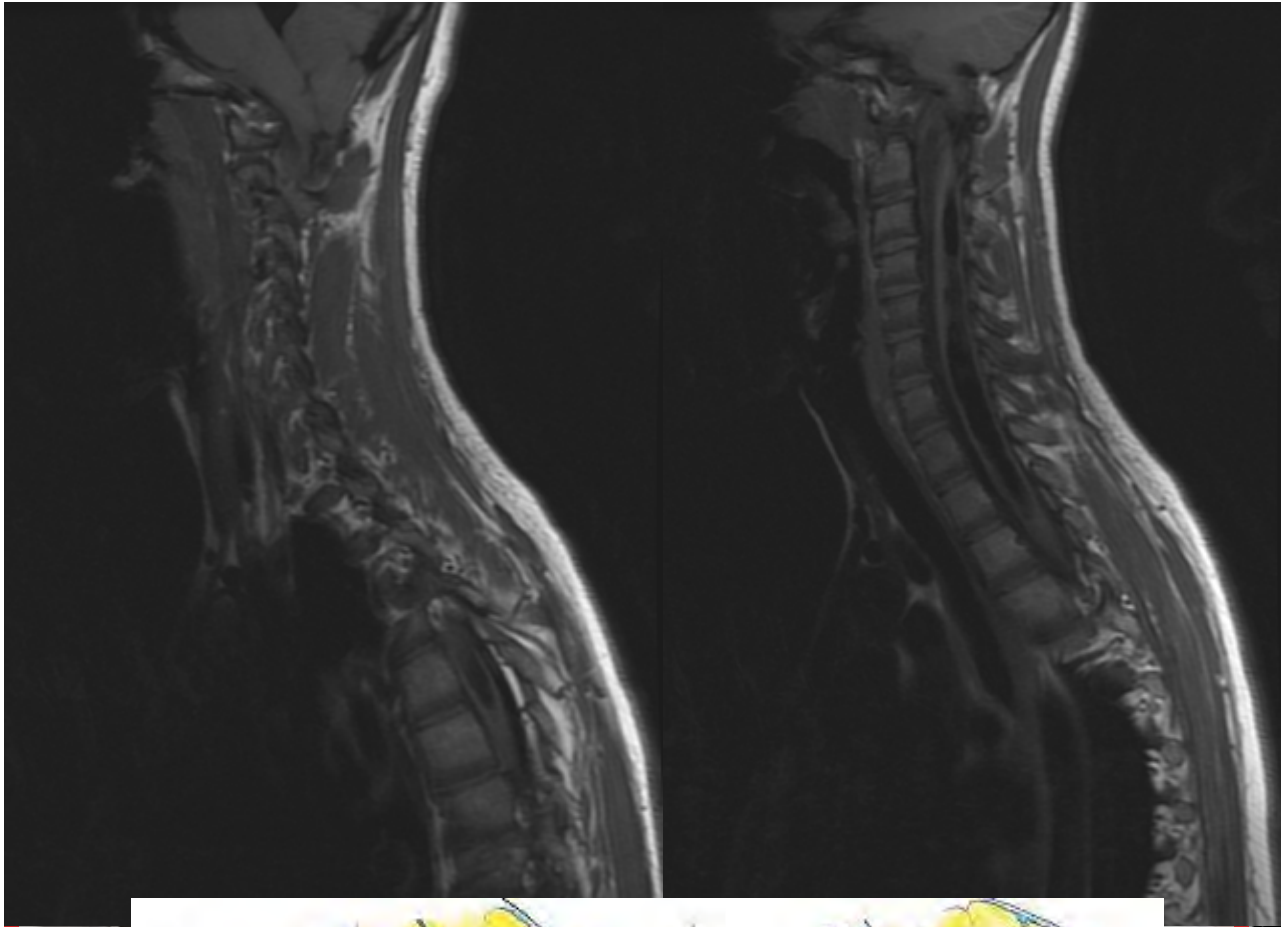
Charleston (night): lumbar or T/L curves <math><35^{\circ}</math>





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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