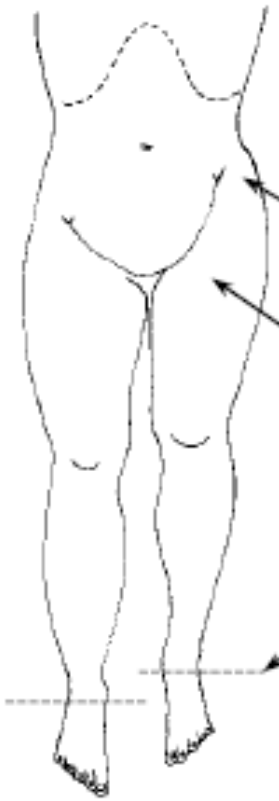


Fixed Adduction Deformity of Left Hip

Compensation by developing a scoliosis leading to:

Elevation of left
anterior superior iliac spine

Pelvic outlet points towards affected side

Apparent leg shortening due to elevation of pelvis and hip joint

Radiographic examples

HME

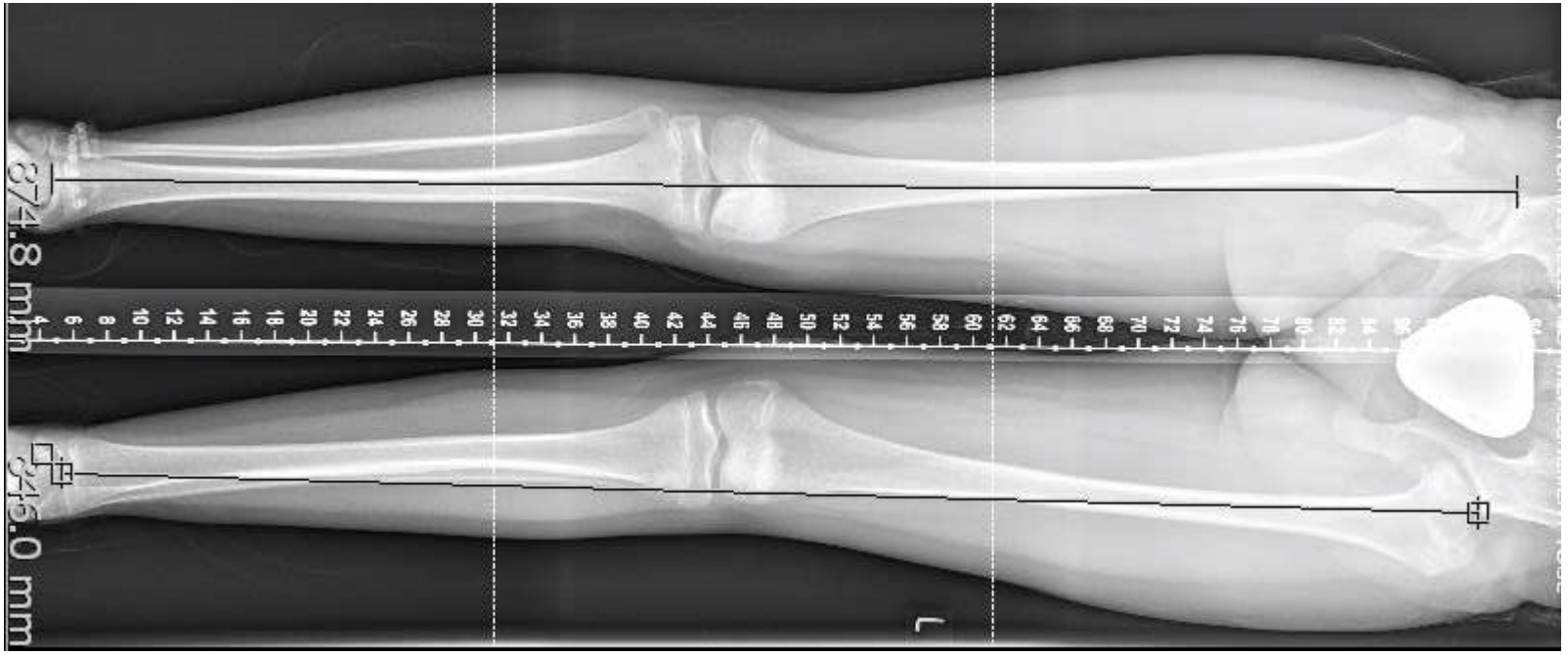
FIGURE 1: Full length radiograph (a) of the lower extremities reveals multiple hereditary exostoses (diaphyseal aclasia) with multiple exostoses of the femorae, tibiae and fibulae bilaterally, with irregular enlargement and calcification of the medial distal femoral exostosis (red arrows). Image b is of a smaller field of view).

Fibula hemimelia: age 5.5 yrs

Need to also take foot height into consideration with fibula hemimelia

Hip deformities: LCPD

Hip deformity cont

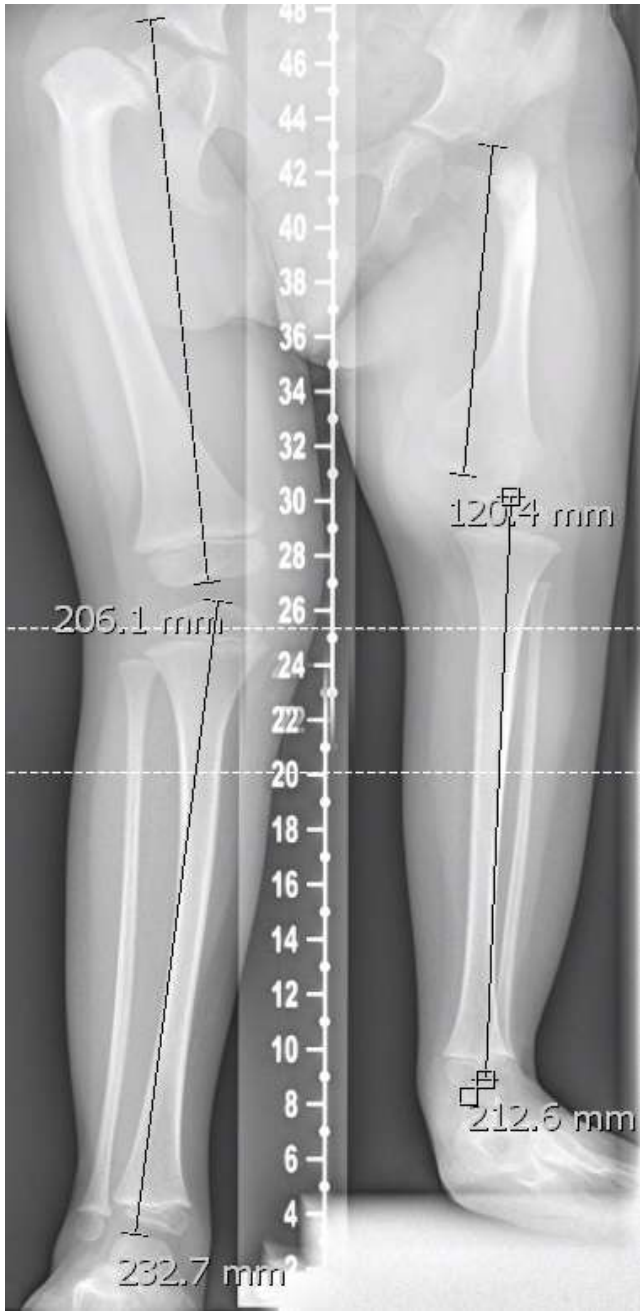


- May be more appropriate to measure from ASIS but missing off xray (acetabula asymmetry)

PFFD

Aged 14 months

Aged 4



PFFD

- Aged 5
- LLD also affected by FFD at the left unstable knee

PFFD cont

- Aged 7

Meningococcal Septicaemia

Physeal trauma

Beckwith-Wiedeman Syndrome

Tibial epiphyseal injury - hutchinson

OCD
Problems measuring:
Cant use ASIS due to pelvic asymmetry
?use umbilicus
Radiograph – femur is rotated
Use blocks and PSIS level

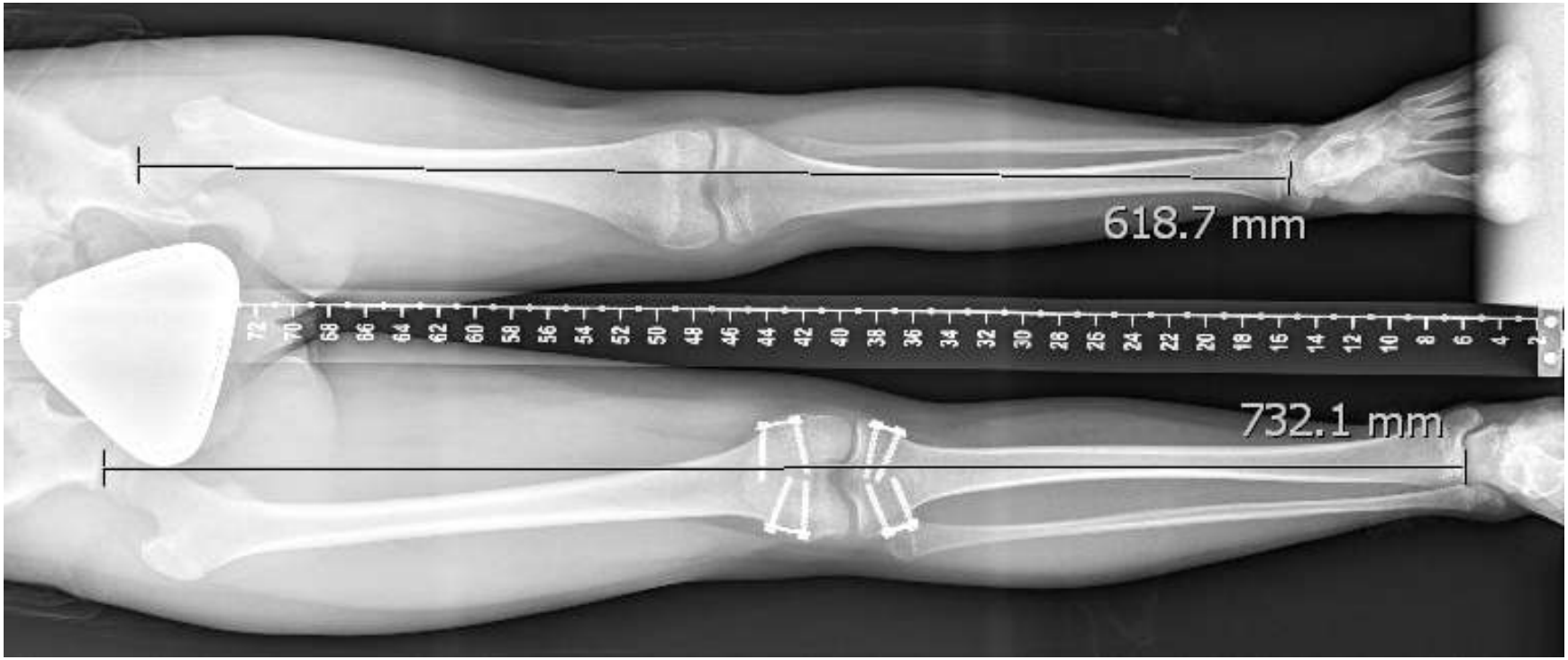
congenital patella dislocation, congenital short femur, fibula hemimelia

Age 5 LLD

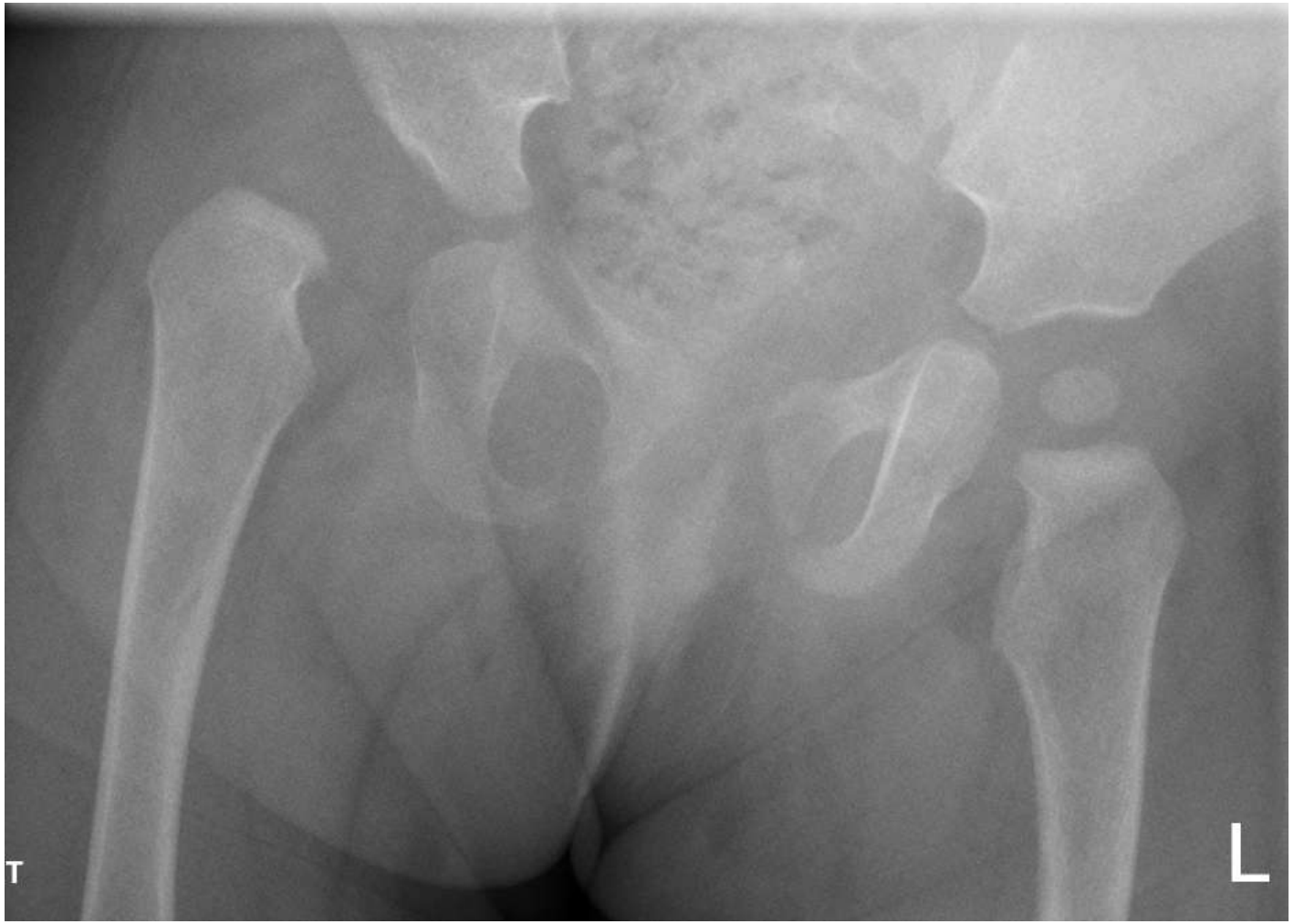
Femur Right 26.6 Left 20.7
Tibia Right 21.7 Left 19.6
Foot involvement ?

Overall discrepancy 5.9+2.1=8cms

Right prox tibial and distal femoral epiphyseodesis Feb 2013, aged 12



Nov 2014: LLD overall 11cms


T
L

Estimation of LLD at skeletal maturity

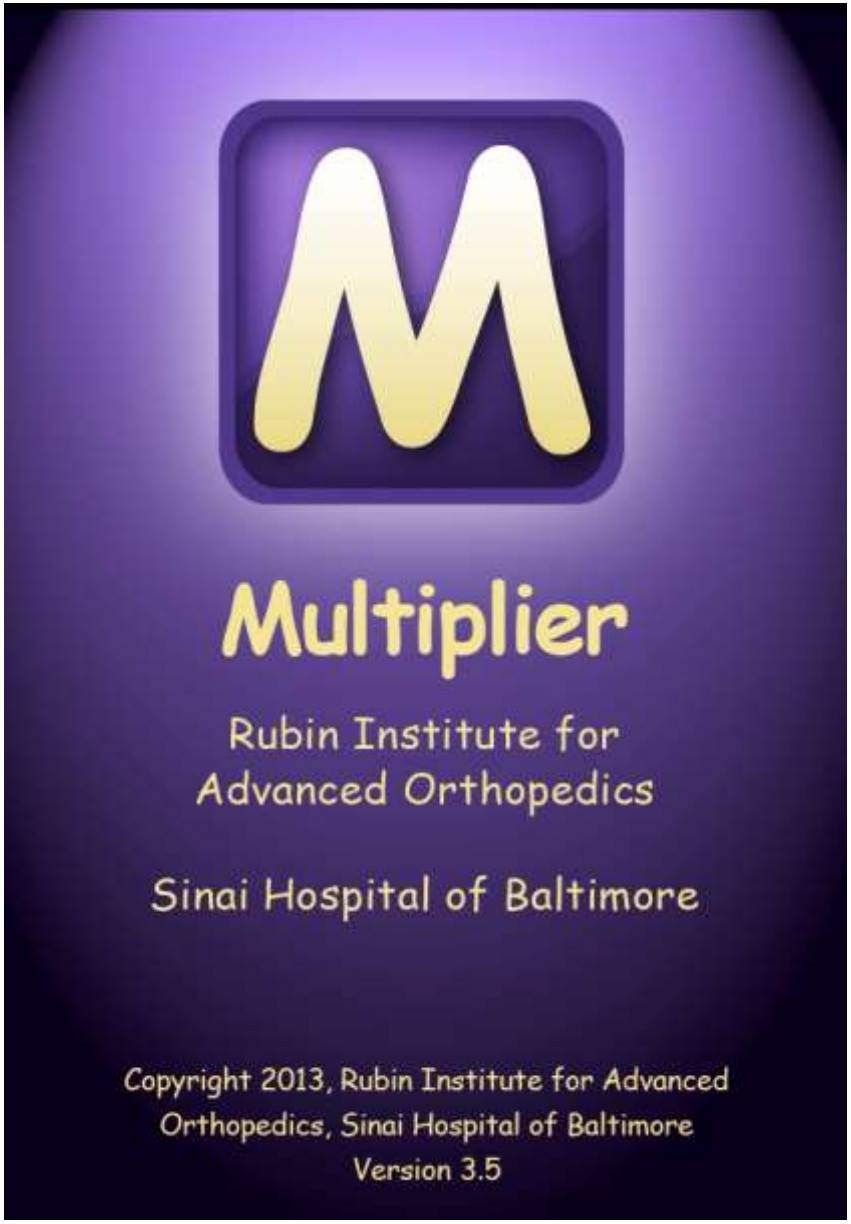
Multiplier Method for Predicting Limb-Length Discrepancy

- Dror Paley, Anil Bhave, John E. Herzenberg and J. Richard Bowen. *J Bone Joint Surg Am.* 2000;82:1432.

LOWER-LIMB MULTIPLIERS FOR BOYS AND GIRLS

Age (yrs. + mos.)	Multiplier	
	Boys	Girls*
Birth	5.080	4.630
0 + 3	4.550	4.155
0 + 6	4.050	3.725
0 + 9	3.600	3.300
1 + 0	3.240	2.970
1 + 3	2.975	2.750
1 + 6	2.825	2.600
1 + 9	2.700	2.490
2 + 0	2.590	2.390
2 + 3	2.480	2.295
2 + 6	2.385	2.200
2 + 9	2.300	2.125
3 + 0	2.230	2.050
3 + 6	2.110	1.925
4 + 0	2.000	1.830
4 + 6	1.890	1.740
5 + 0	1.820	1.660
5 + 6	1.740	1.580
6 + 0	1.670	1.510
6 + 6	1.620	1.460
7 + 0	1.570	1.430
7 + 6	1.520	1.370
8 + 0	1.470	1.330
8 + 6	1.420	1.290
9 + 0	1.380	1.260
9 + 6	1.340	1.220
10 + 0	1.310	1.190
10 + 6	1.280	1.160
11 + 0	1.240	1.130
11 + 6	1.220	1.100
12 + 0	1.180	1.070
12 + 6	1.160	1.050
13 + 0	1.130	1.030
13 + 6	1.100	1.010
14 + 0	1.080	1.000
14 + 6	1.060	NA
15 + 0	1.040	NA
15 + 6	1.020	NA
16 + 0	1.010	NA
16 + 6	1.010	NA
17 + 0	1.000	NA

*NA = not applicable.


Multiplier
Rubin Institute for
Advanced Orthopedics
Sinai Hospital of Baltimore
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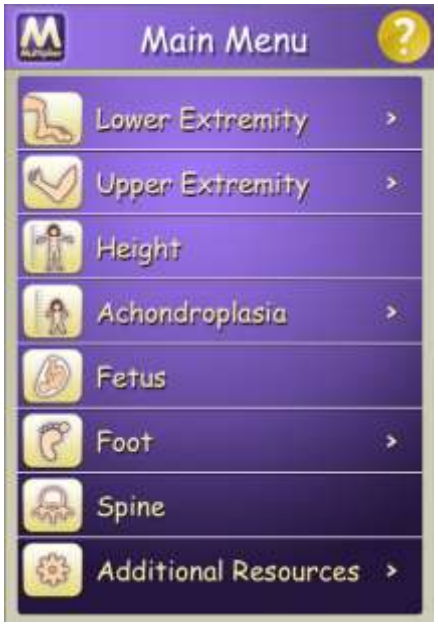
Version 3.5


Main Menu
Lower Extremity
Upper Extremity
Height
Achondroplasia
Fetus
Foot
Spine
Additional Resources


Back
Lower Extremity
LLD (congenital)
LLD (developmental)
Growth Remaining
Bone Length
Timing of Angular Correction
Timing of Epiphysiodesis
Comprehensive (congenital) LLD and Epiphysiodesis
LLD: Limb length discrepancy

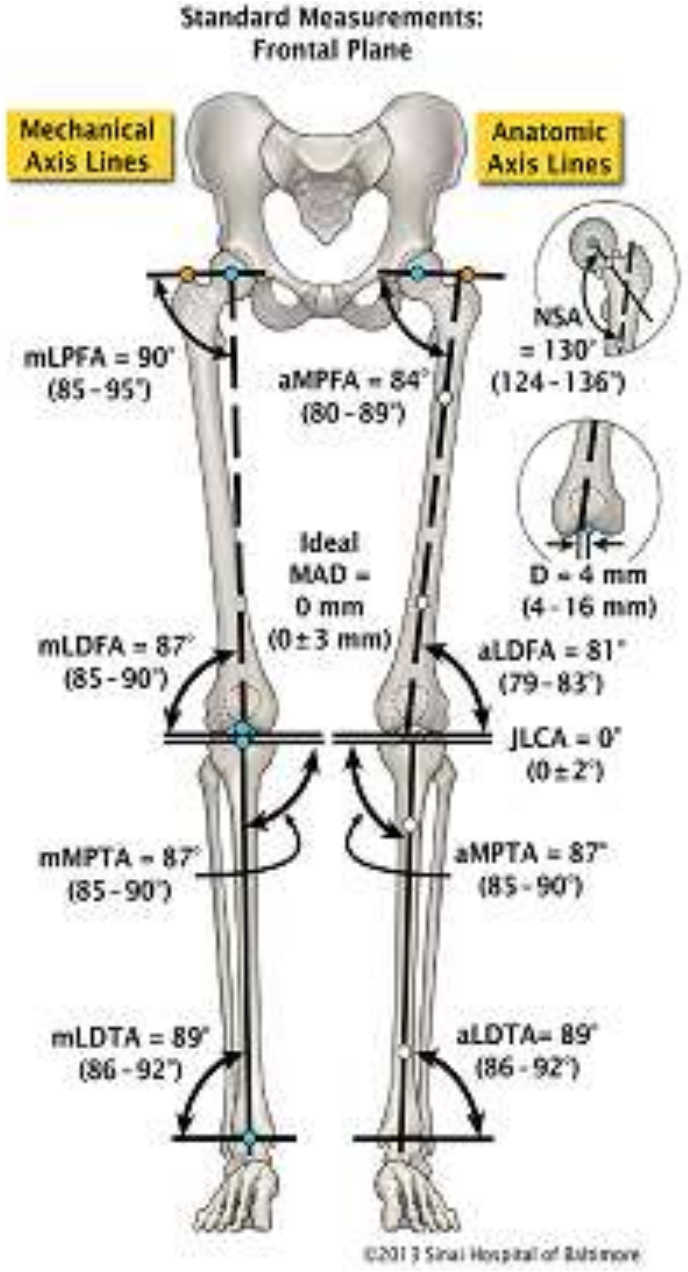

Back
LLD (congenital)
Select:
Tibia
Sex:
Male
Female
DOB:
Nov 01 2007
Age:
7
Years
7
Months
LLD:
3.1
cm
Prior Lengthening(s):


Back
Results
LLD (congenital) at Maturity
1.8 in
4.7 cm
Tibia
LLD (congenital) at Every Age

SPR teaching 8th June – Angular/Rotational deformity

Normal

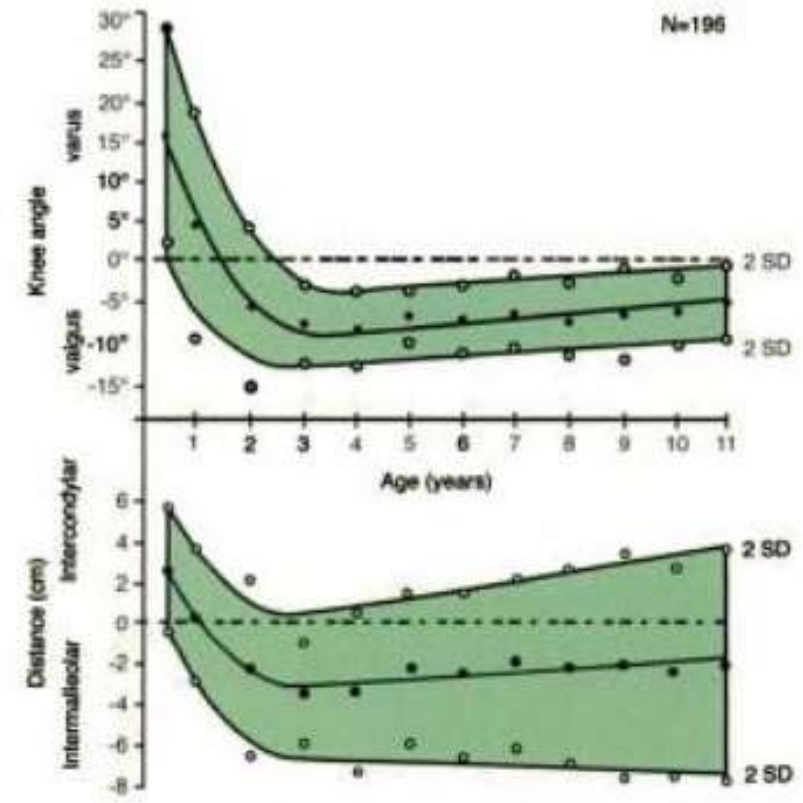
- Angles
- Varus/Valgus
- Torsion



Assessment

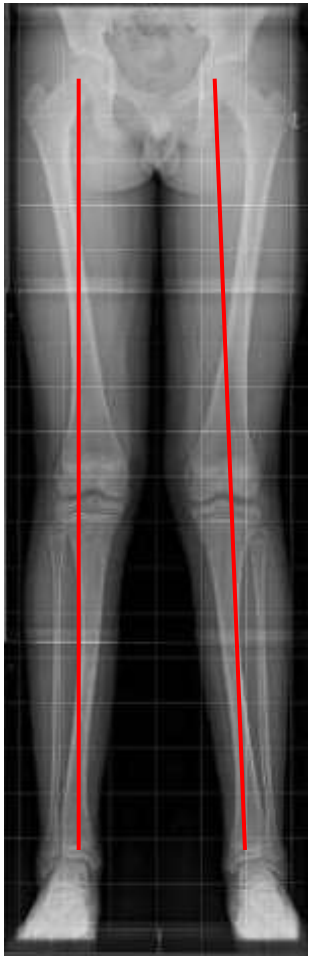
- Clinical
  - Intramalleolar distance *weightbearing or NWB?
  - Intercondylar distance
  - Rotation
- Radiographic

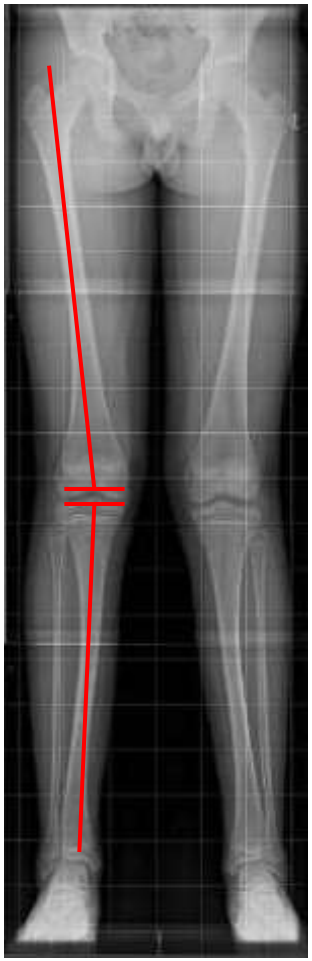
Knock knee / Bow leg

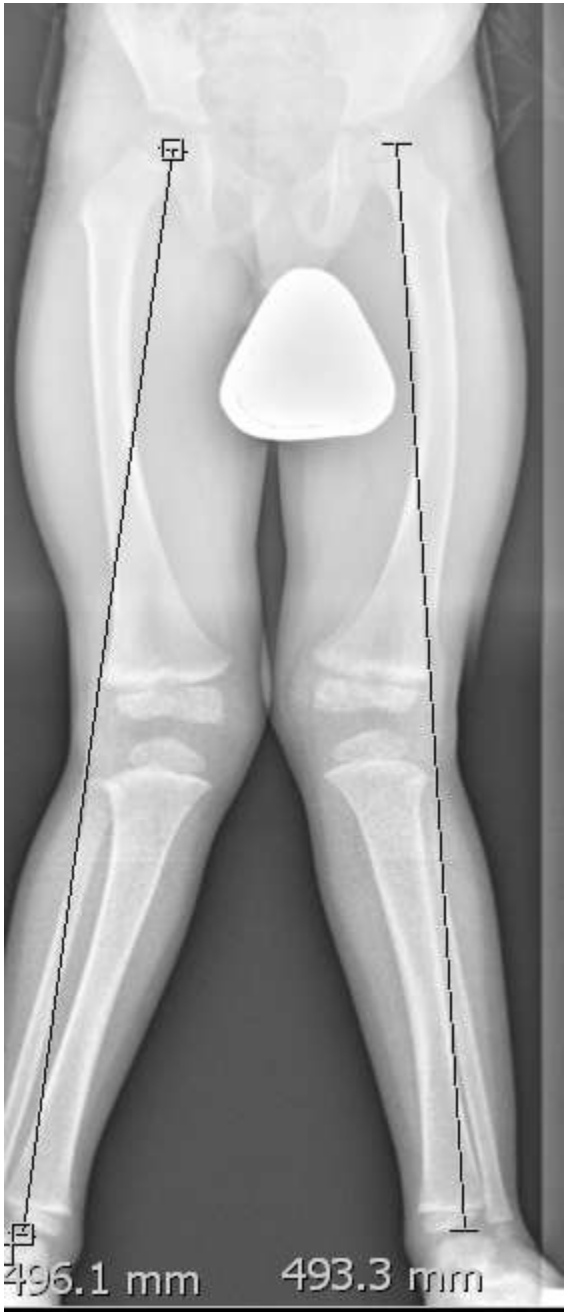


B Normal values for knee angle The normal values for the knee angle are shown in knee angle and intermalleolar or intercondylar distances. From Heath and Staheli (1993).

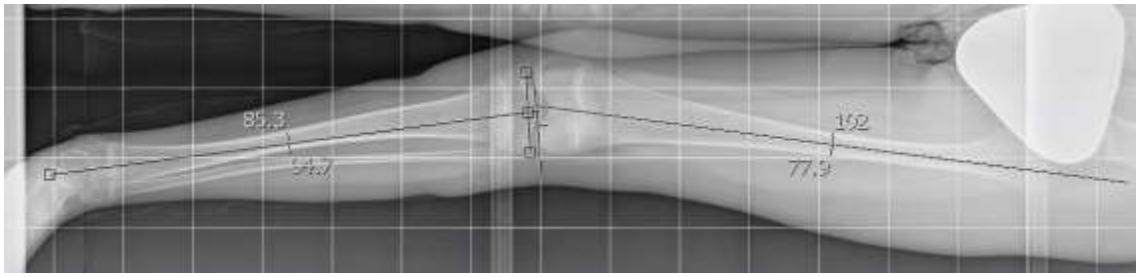
Limb alignment






496.1 mm
493.3 mm

Genu valgum
Intramalleolar distance and radiological evaluation



Physiological or pathological?

- If the knee angle or Intercondylar/intra-malleolar distance falls more than 2SD from the normal line consider further investigation
- Certain conditions can present with genu valgum/varum
  - Achondroplasia (will also have short stature)
  - Rickets
  - Growth plate arrest

In-toeing/Out-toeing

- Observe family
- Usually doesn’t bother the child at all and is purely an aesthetic problems for the parents (usually mothers)
- Excessive external rotation is much more problematic than internal rotation at a young age as the limbs naturally externally rotate with development

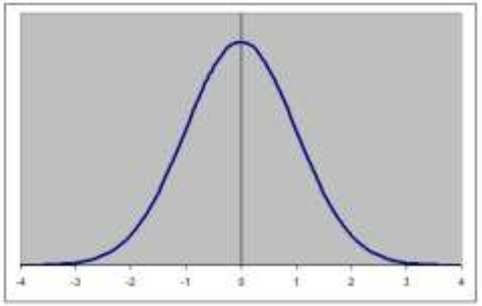
Terminology

- “version” describes the normal variation in limb rotation

  e.g. Femoral anteversion and retroversion

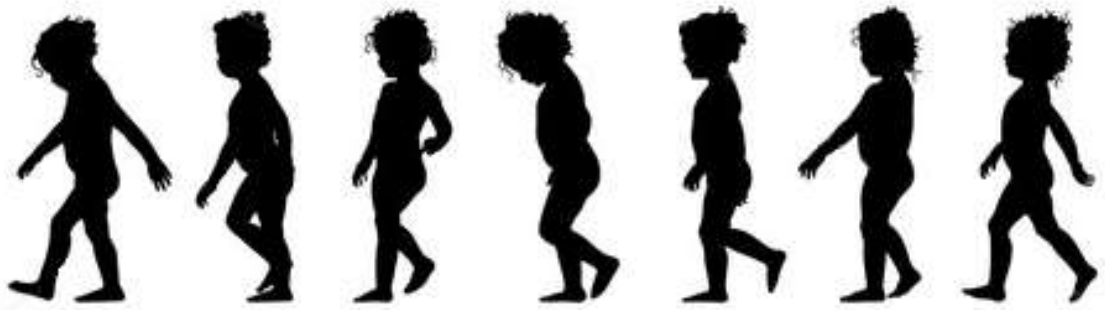
- In the “normal” the tibia is laterally rotated and the femur internally rotated

- “torsion” describes version beyond ±2SD from the mean

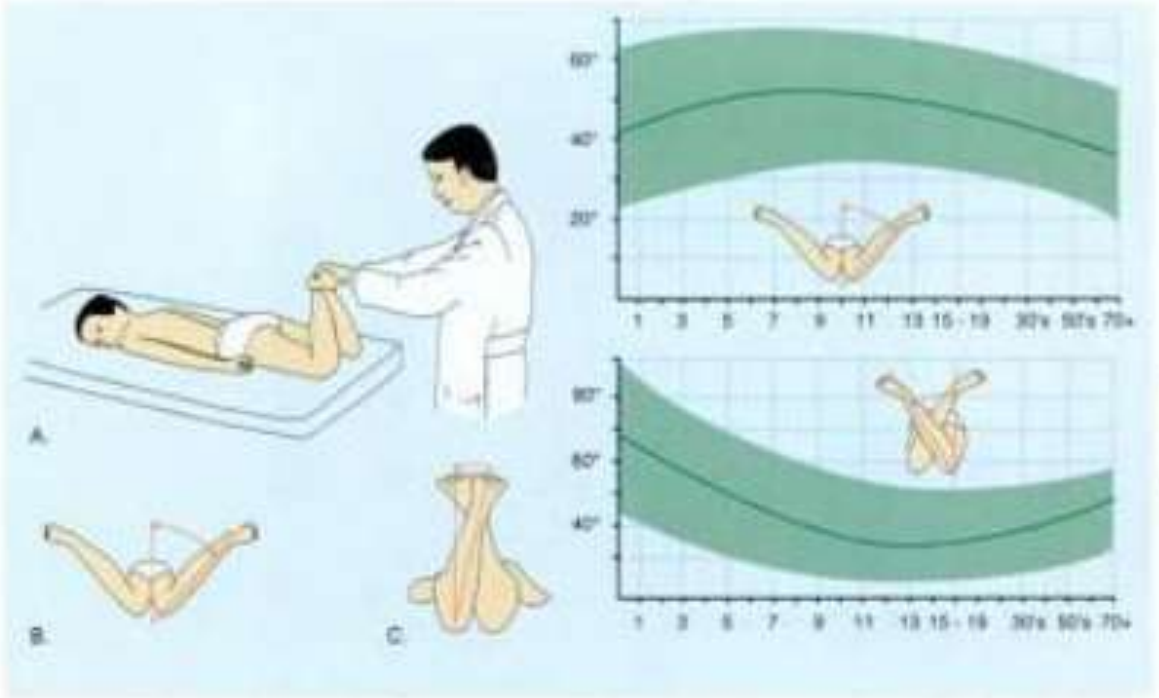


What to examine

- Foot progression angle during gait
- Hip rotation / femoral version
- Tibial version
- Foot shape

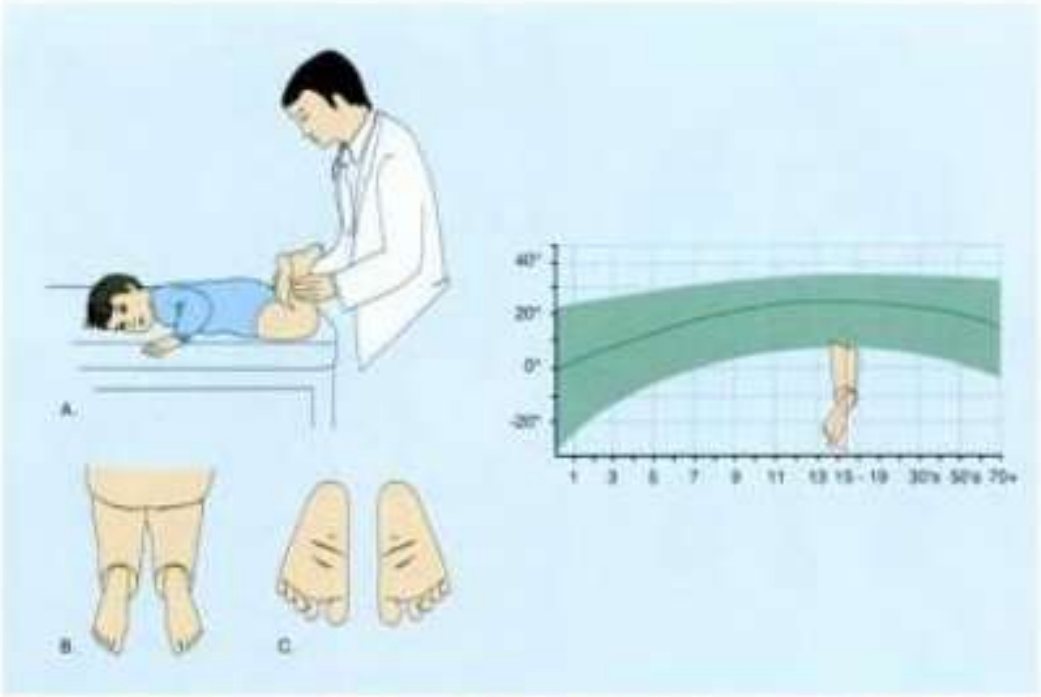


Hip & femur



B Hip rotation Hip rotation is assessed with the child prone (A). Internal rotation (B) and external rotation (C) are measured. Normal ranges are shown in green.

Tibia & foot



D Assessing rotational status of tibia and foot The rotational status of the tibia and foot are best assessed by evaluating the child in the prone position (A), allowing the foot to fall into a natural resting position. The thigh-foot axis (B) and shape of the foot (C) are readily determined. The range of normal is shown in green.

Foot shape