Common Pediatric Lower Limb Disorders

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Acknowledgement:

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Topics to Cover

1. In-toeing
2. Genu (varus & valgus), & proximal tibia vara
3. Club foot
4. L.L deformities in C.P patients
5. Limping & leg length inequality
6. Leg aches

1) Intoeing

Intoeing- Evaluation

- Detailed history
  - Onset, who noticed it, progression
  - Fall a lot
  - How sits on the ground
- Screening examination (head to toe)
- Pathology at the level of:
  - Femoral anteversion
  - Tibial torsion
  - Forefoot adduction
  - Wandering big toe

Intoeing- Asses rotational profile

Pathology Level

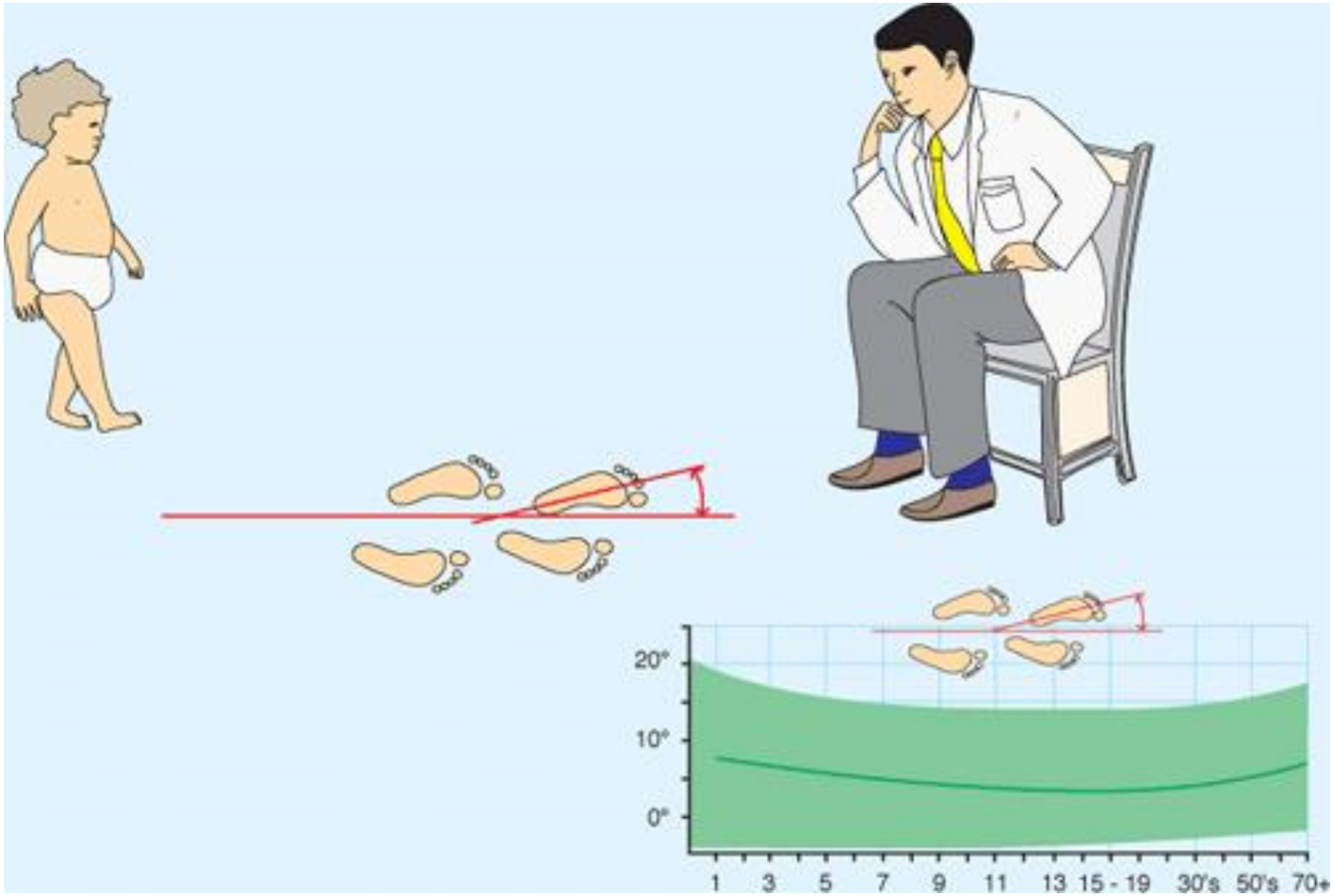
- Femoral anteversion
- Tibial torsion
- Forefoot adduction
- Wandering big toe

Special Test

- Hips rotational profile:
  - Supine
  - Prone
- Inter-malleolus axis:
  - Supine
  - Prone
- Foot thigh axis
- Heel bisector line

Intoeing- Special Test

Foot Propagation Angle → normal is (-10°) to (+15°)



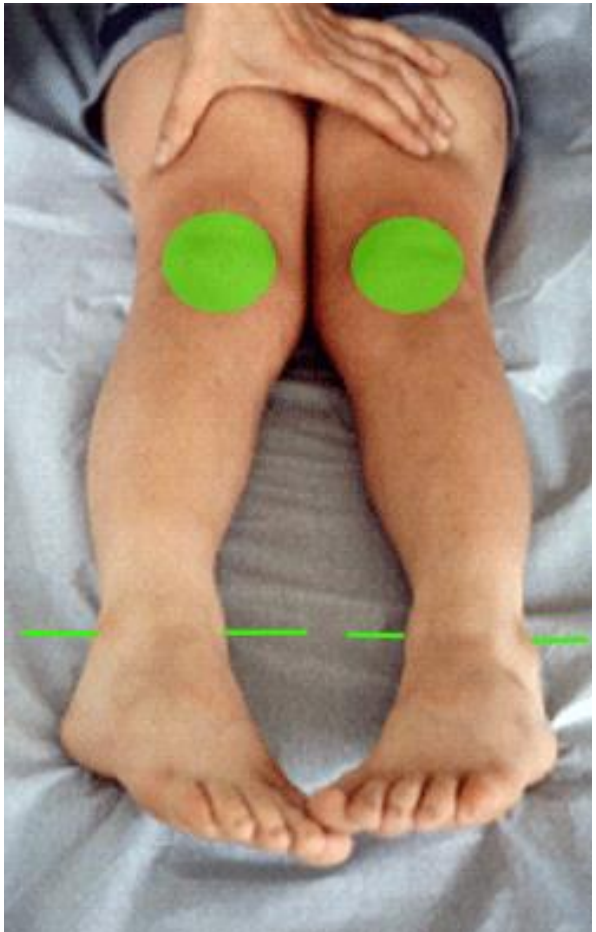
Intoeing- Femoral Anteversion

Hips rotational profile, supine → IR/ER normal = 40-45/45-50°

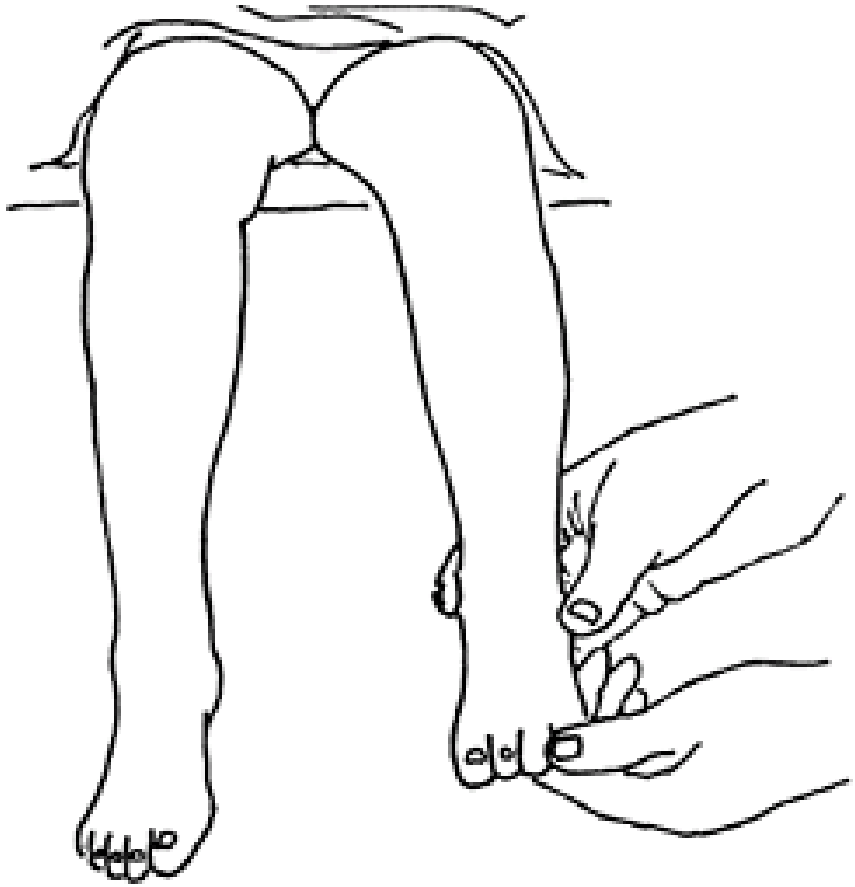
Intoeing- Tibial Torsion

Inter-malleolus axis

Supine position

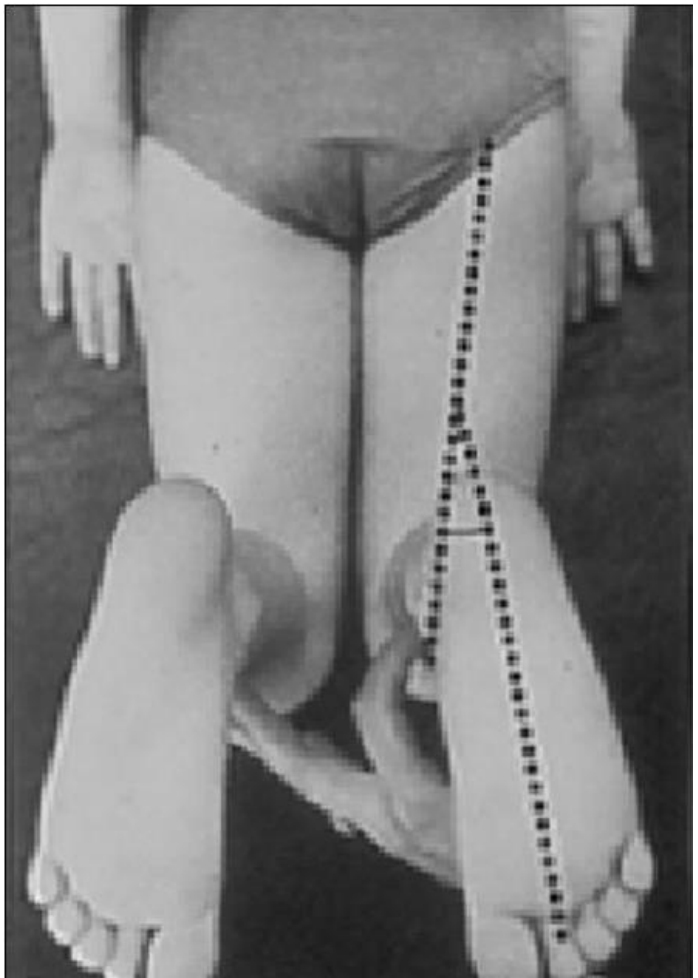


Sitting position



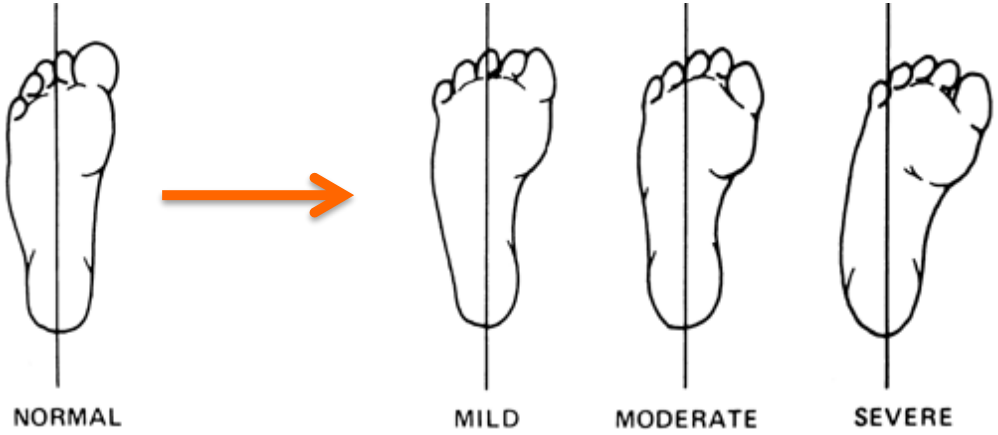
Intoeing- Tibial Torsion

Foot Thigh Axis → normal (0°) to (-10°)



Intoeing- Forefoot Adduction

Heel bisector line → normal along 2 toe



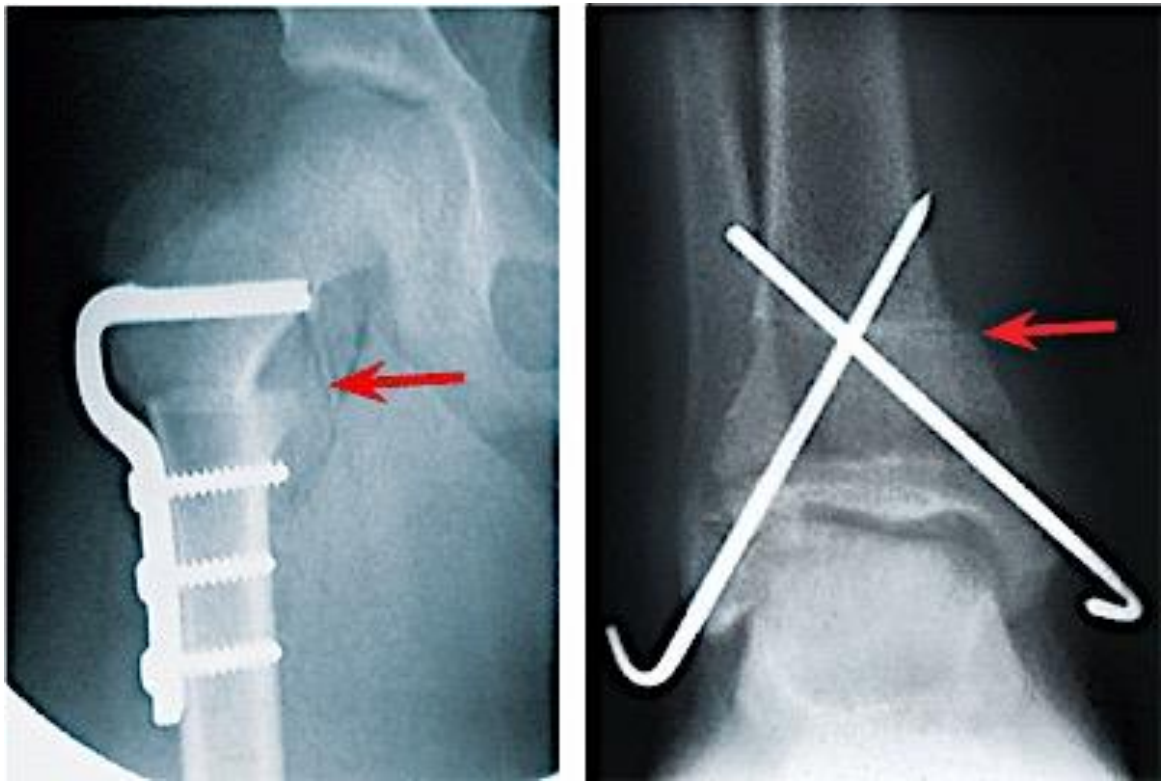
Intoeing- Adducted Big Toe


Intoeing- Treatment


- Establish correct diagnosis
- Parents education
- Annual clinic F/U → asses degree of deformity
- Femoral anti-version → sit cross legged
- Tibial torsion → spontaneous improvement
- Forefoot adduction → anti-version shoes, or proper shoes reversal
- Adducted big toe → spontaneous improvement

Intoeing- Treatment

- Operative correction indicated for children:
  - (> 8) years of age
  - With significant cosmetic and functional deformity → <1%



2) Genu Varus & Valgus

Normal Genu Varum and Genu Valgum

Genu Varum and Genu Valgum

- Types:
  - Physiological is usually → bilateral
  - Pathological → can be unilateral

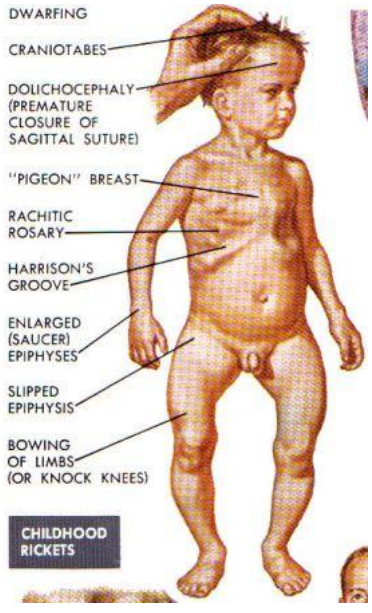
Genu Varum and Genu Valgum

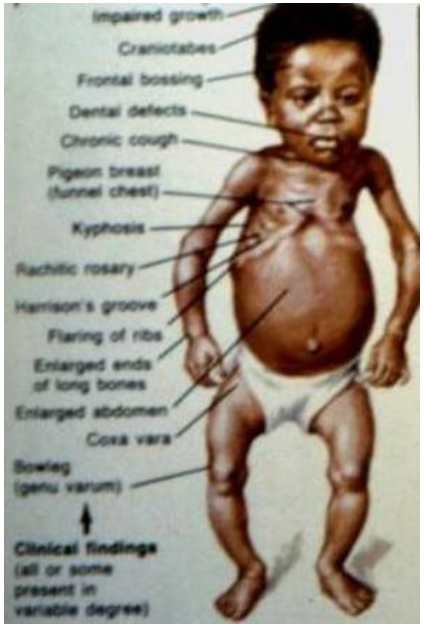
- Types:
  - Physiologic
  - Pathologic

Feature	Physiologic	Pathologic
Frequency		
Family history		
Diet		
Health		
Onset		
Effect of growth		
Height		
Symmetry		
Severity		

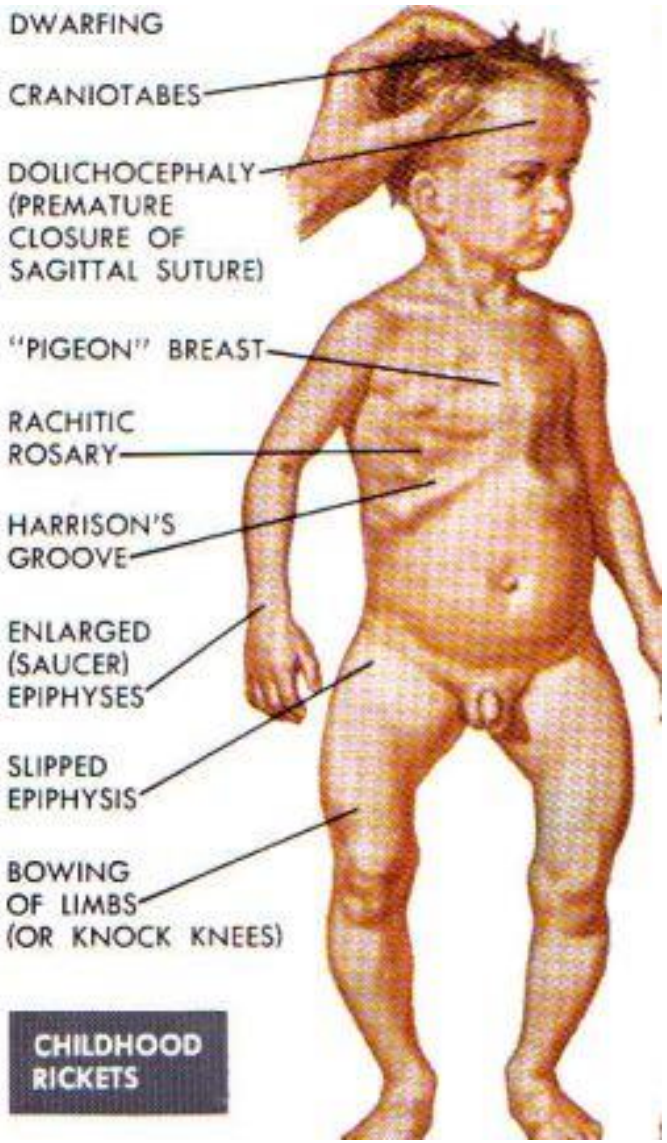
Genu Varum and Genu Valgum

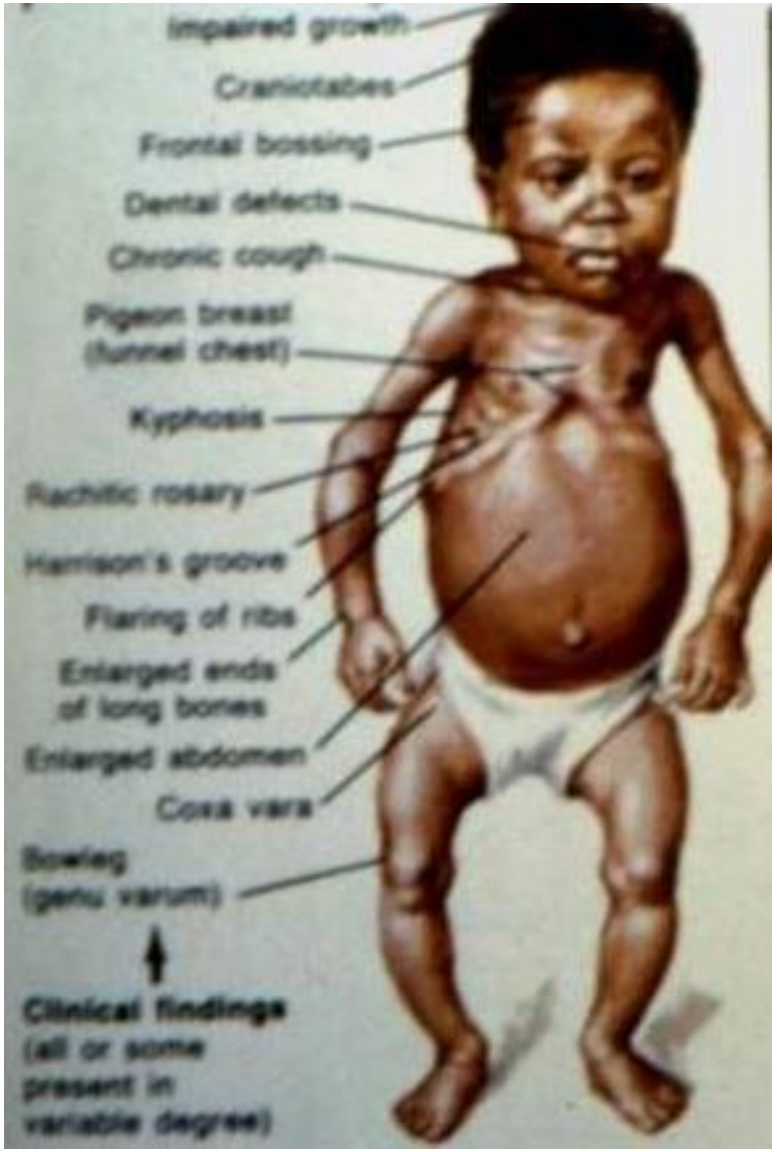
- Evaluation
  - History (detailed)
  - Examination (signs of Rickets)
  - Laboratory





Genu Varum and Genu Valgum

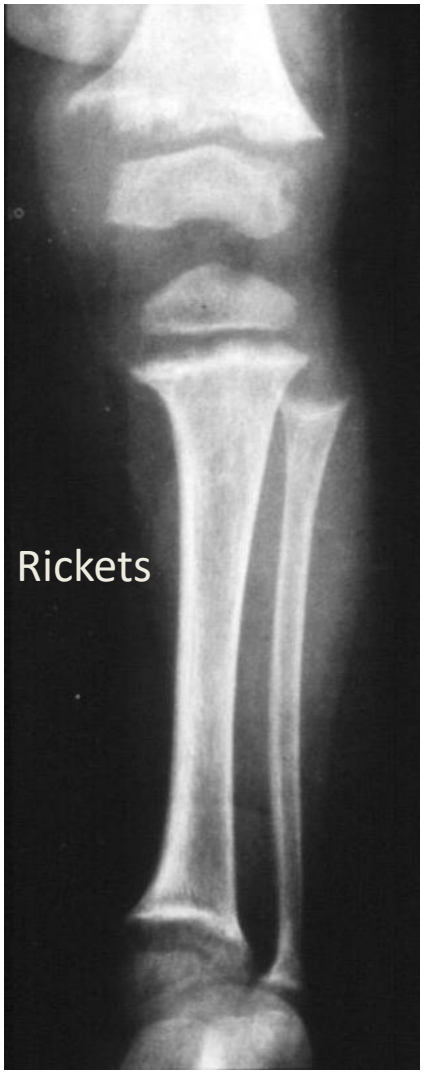




Genu Varum and Genu Valgum

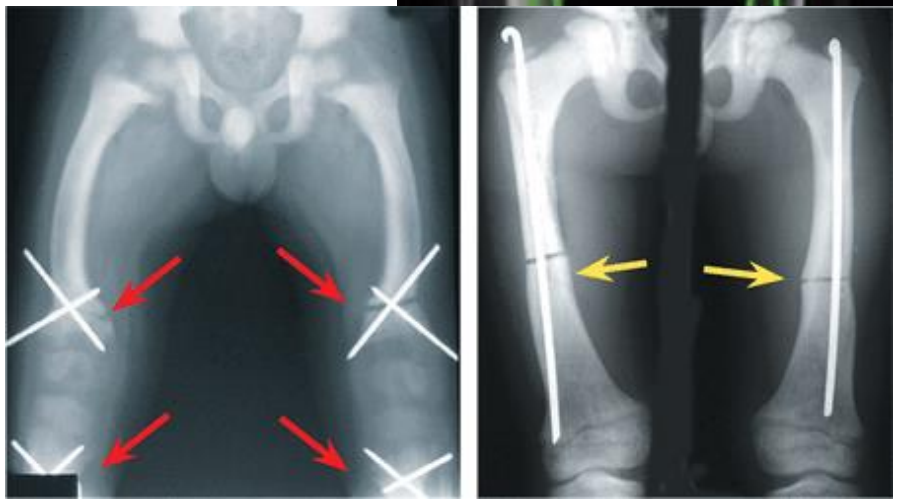
Genu Varum and Genu Valgum

- Evaluation:
  - Imaging



Genu Varum and Genu Valgum

- Management principles:
  - Non-operative:
    - Physiological → usually
    - Pathological → must treat underlying cause, as rickets
  - Epiphysiodesis
  - Corrective osteotomies

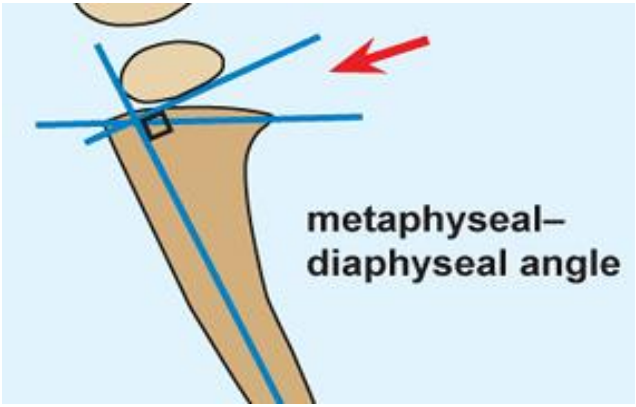


“Proximal Tibia Vara”

Proximal Tibia Vara

- "Blount disease": damage of proximal medial tibial growth plate of unknown cause
- Usually:
  - Overweight
  - Dark skinned
- Types:
  - Infantile → < 3y of age, usually Bil & early walkers
  - Juvenile → 3 -10 y, combination
  - Adolescent → > 10y, usually unilateral

Blount Disease- Staging



Blount Disease- Investigation

- MRI is mandatory:
  - When:
    - Sever cases
    - Recurrence
  - Why?



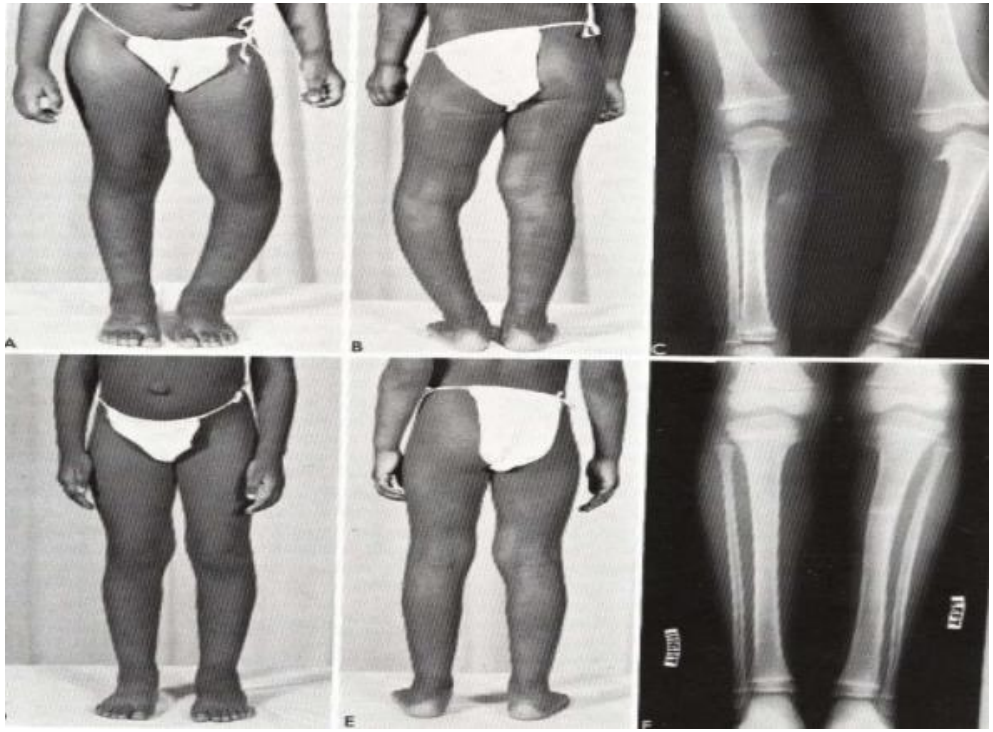
Blount Disease- Treatment

Bilateral

Unilateral

- Types:
  - Infantile
  - Adolescent

Blount Disease



3) Club Foot

Clubfoot

- Etiology
  - Postural → fully correctable, needs only *intensive P.T*
  - Idiopathic (CTEV) → partially correctable
  - Secondary (Spina Bifida) → rigid deformity, pt needs workup

Clubfoot

- Clinical examination

  <u>Characteristic Deformity :</u>

  - **Hind foot:**
    - Equinus (Ankle joint, tight A.T)
    - Varus (Subtalar joint)
  - **Mid & fore foot:**
    - Forefoot Adduction
    - Cavus (pronation)

Clubfoot

Clubfoot

- Clinical examination:
  - Deformities don’t prevent walking
  - Calf muscles wasting
  - Foot is smaller in unilateral affection
  - Callosities at abnormal pressure areas
  - Abnormal cavus crease in middle of the foot

Clubfoot

Clubfoot

- Management:

The goal of treatment for is to obtain a foot that is plantigrade, functional, painless, and stable over time

A cosmetically pleasing appearance

is also an important goal sought by

surgeon and family

Clubfoot

- Manipulation and serial casts:
  - Technique “Ponseti” serial casting → weekly (usually 6-8w)

  - Validity up to 12-months → soft tissue becomes more tight

Clubfoot

- Manipulation and serial casts:
  - Maintaining correction “Dennis Brown Splint” → 3-4y old

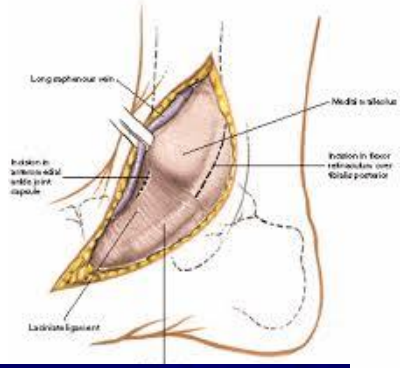
Clubfoot

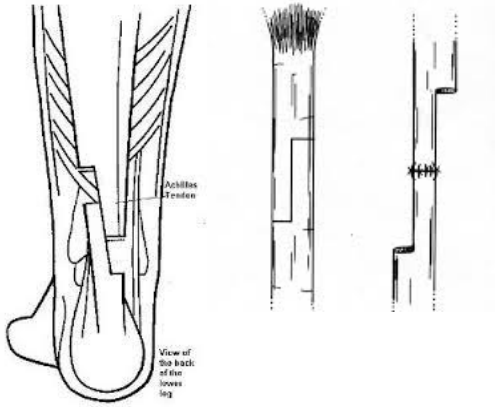
- Manipulation and serial casts:
  - Follow up → watch and avoid recurrence, till 9y old
  - Avoid false correction → by going in sequence
  - When to stop ? → not improving, pressure ulcers

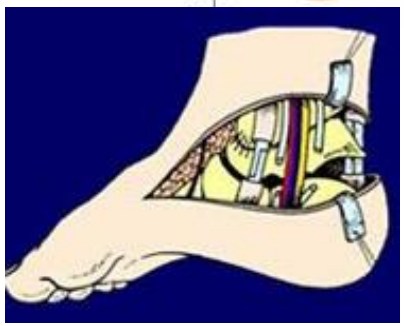
Clubfoot

- Indications of surgical treatment:
  - Late presentation (>12m old)
  - Complementary to conservative treatment, as residual forefoot adduction (also > 12m)
  - Failure of conservative treatment (>9m old)
  - Recurrence after conservative treatment (>9m old)

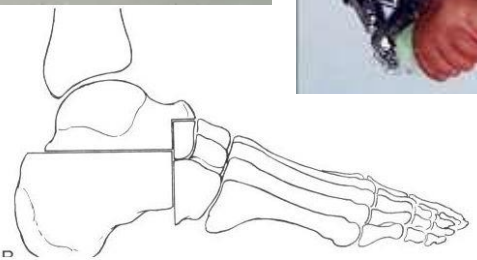
Clubfoot

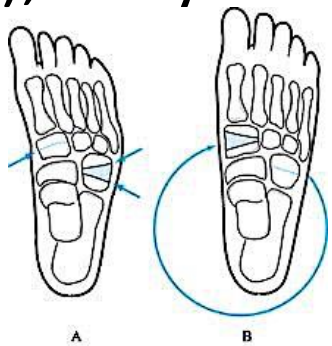


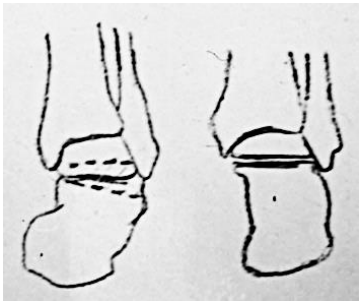


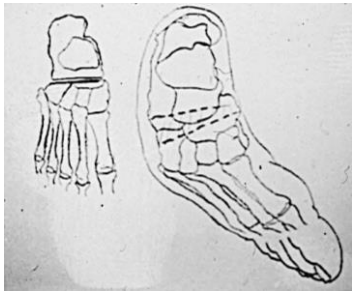


- Types of surgery:
  - Soft tissue → > 9m old
  - Bony → > 3y old
  - If severe & rigid → arthrodesis (types), >10y old









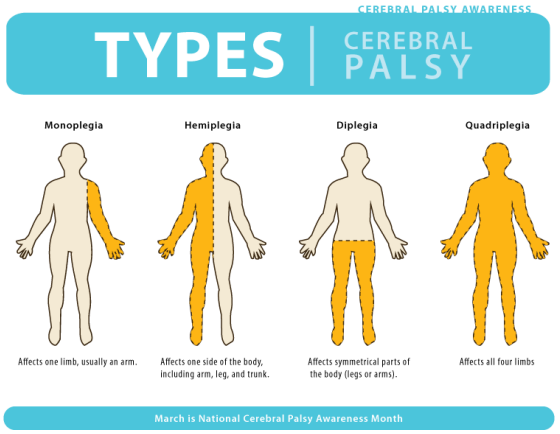
4) L.L Deformities in C.P Patients

Lower Limb Deformities in CP Child

- C.P is → a non-progressive brain insult that occurred during the peri-natal period.
- Causes → skeletal muscles imbalance that affects joint's movements.
- Can be associated with:
  - Mental retardation (various degrees)
  - Hydrocephalus and V.P shunt
  - Convulsions
- Its not-un-common

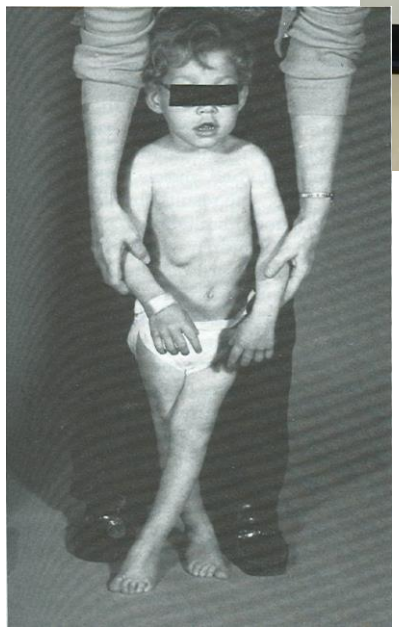
Cerebral Palsy- Types

- Physiological classification:
  - Spastic
  - Athetosis
  - Ataxia
  - Rigidity
  - Mixed
- Topographic classification:
  - Monoplegia
  - Diplegia
  - Paraplegia
  - Hemiplegia
  - Triplegia
  - Quadriplegia or tetraplegia



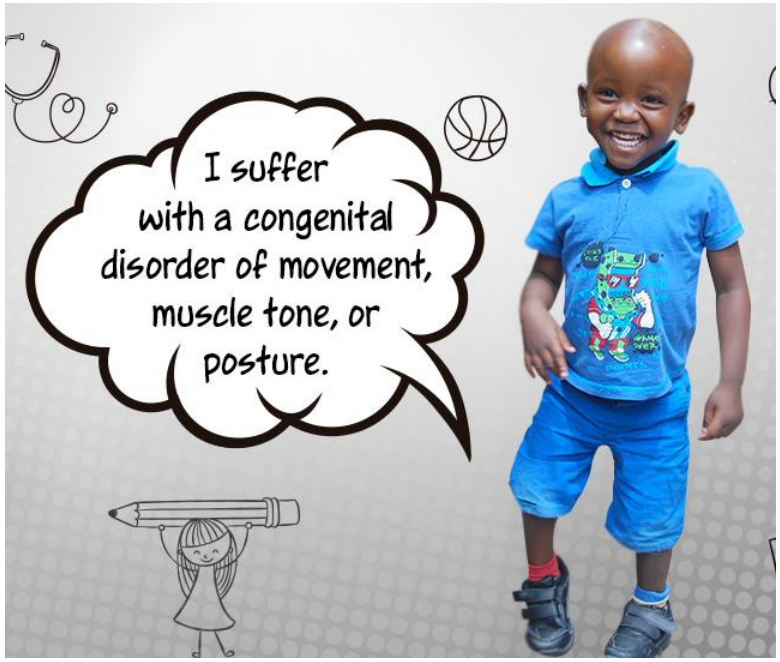
Cerebral Palsy- Clinical Picture

- Hip
  - Flexion
  - Adduction
  - Internal rotation
- Knee
  - Flexion
- Ankle
  - Equinus
  - Varus or valgus
- Gait
  - In-toeing
  - Scissoring
  - Crouch



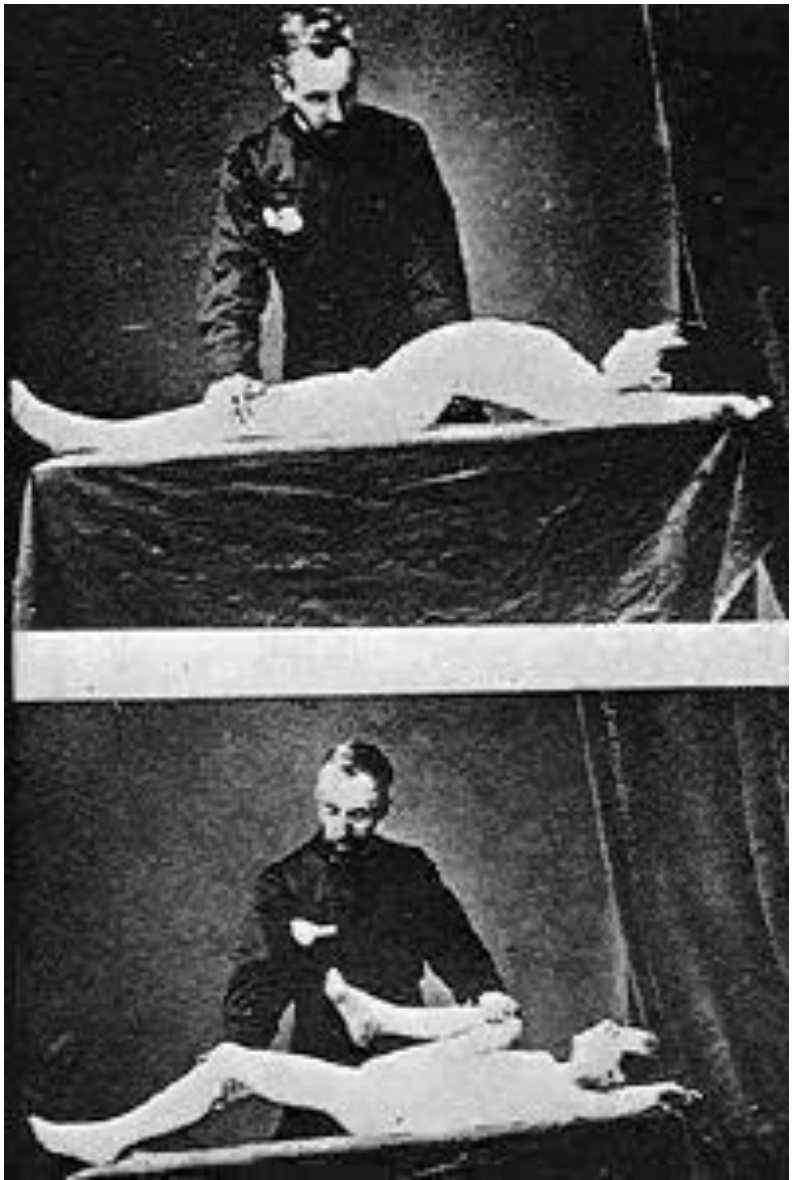
Cerebral Palsy- Clinical Picture

- Right hemiplegia classic appearance:
  - Flexed elbow
  - Flexed wrist
  - Foot equines



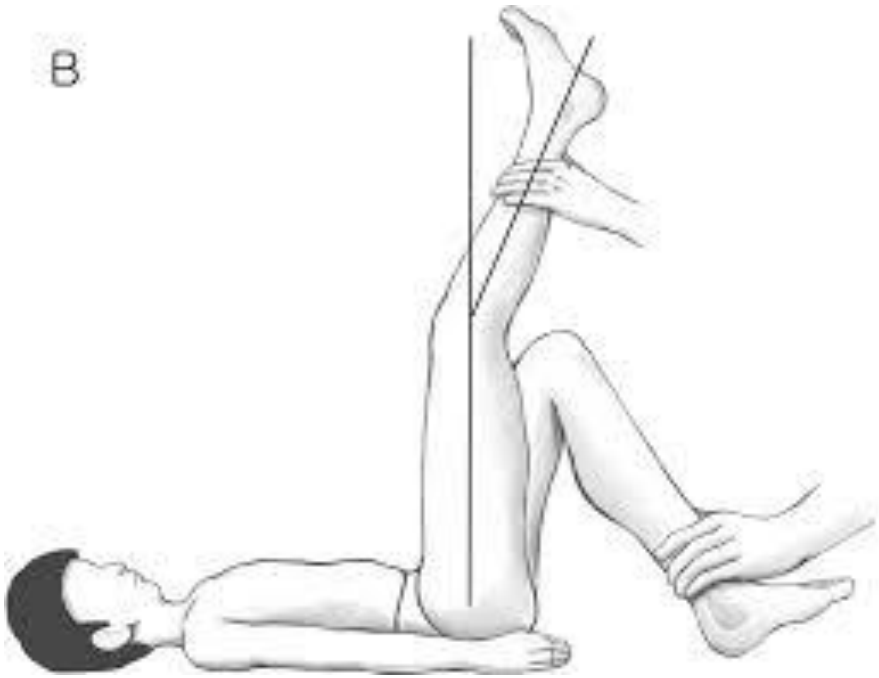
Cerebral Palsy- Examination

- Assessment:
  - Hips → Thomas test



Cerebral Palsy- Examination

- Assessment:
  - Knees → popliteal angle



Cerebral Palsy- Examination

- Assessment:
  - Ankles → Achilles tendon shorting

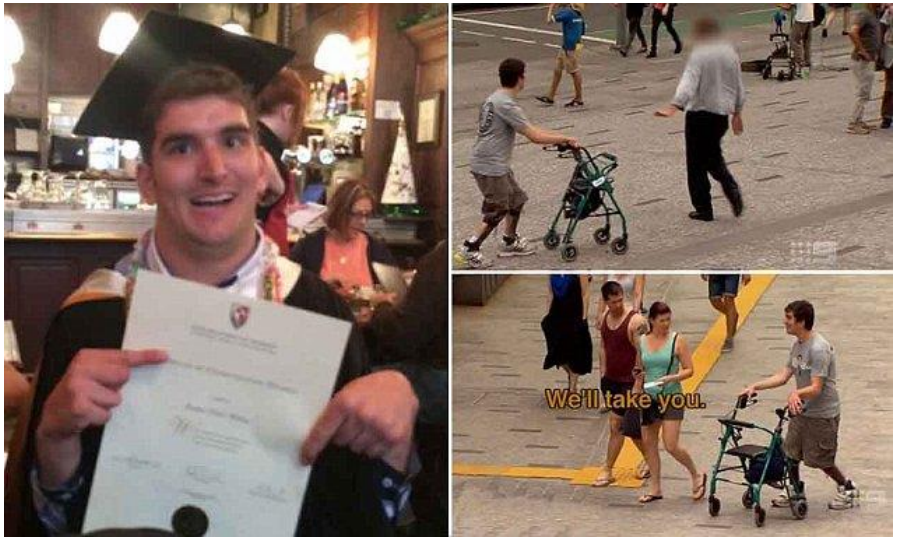
Cerebral Palsy- Treatment

- Is multidisciplinary
- Parents education
- Pediatric neurology → diagnosis, F/U, treat fits
- ***P.T (home & center)*** → joints R.O.M, gait training
- Orthotics → maintain correction, aid in gait
- Social / Government aid
- Others:
  - Neurosurgery (V.P shunt),
  - Ophthalmology (eyes sequent),
  - …etc.

Cerebral Palsy- Treatment

Cerebral Palsy- Treatment

P.T should be as fun & games



Being a quadriplegic dose not mean they can not walk or can not get a colleague degree

Cerebral Palsy- Treatment

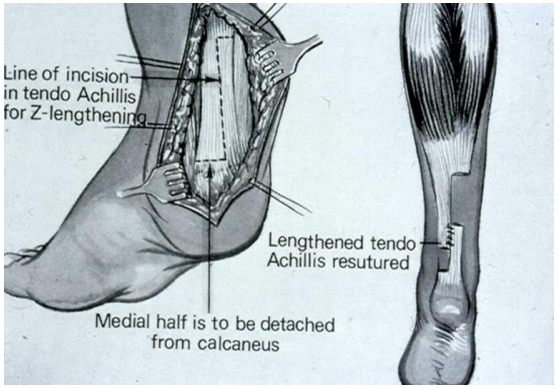
Give them a chance, support them, let them enjoy their lives

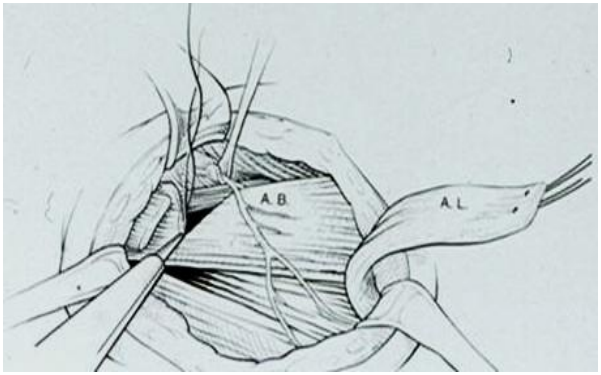
Cerebral Palsy- Treatment

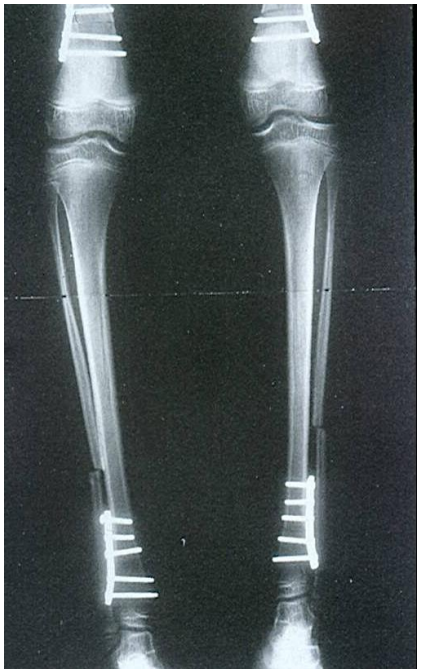
- Indications of Orthopedic surgery:
  - Sever contractures preventing P.T
  - P.T plateaued due to contractures
  - Perennial hygiene (sever hips adduction)
  - In a non-walker to sit comfortable in wheelchair
  - Prevent:
    - Neuropathic skin ulceration (as feet)
    - Joint dislocation (as hip)

Cerebral Palsy- Treatment

- Options of Surgery:
  - Tendon elongation
  - Tendon Transfer
  - Tenotomy
  - Neurectomy
  - Bony surgery → Osteotomy/Fusion







5) Limping

Limping Definition

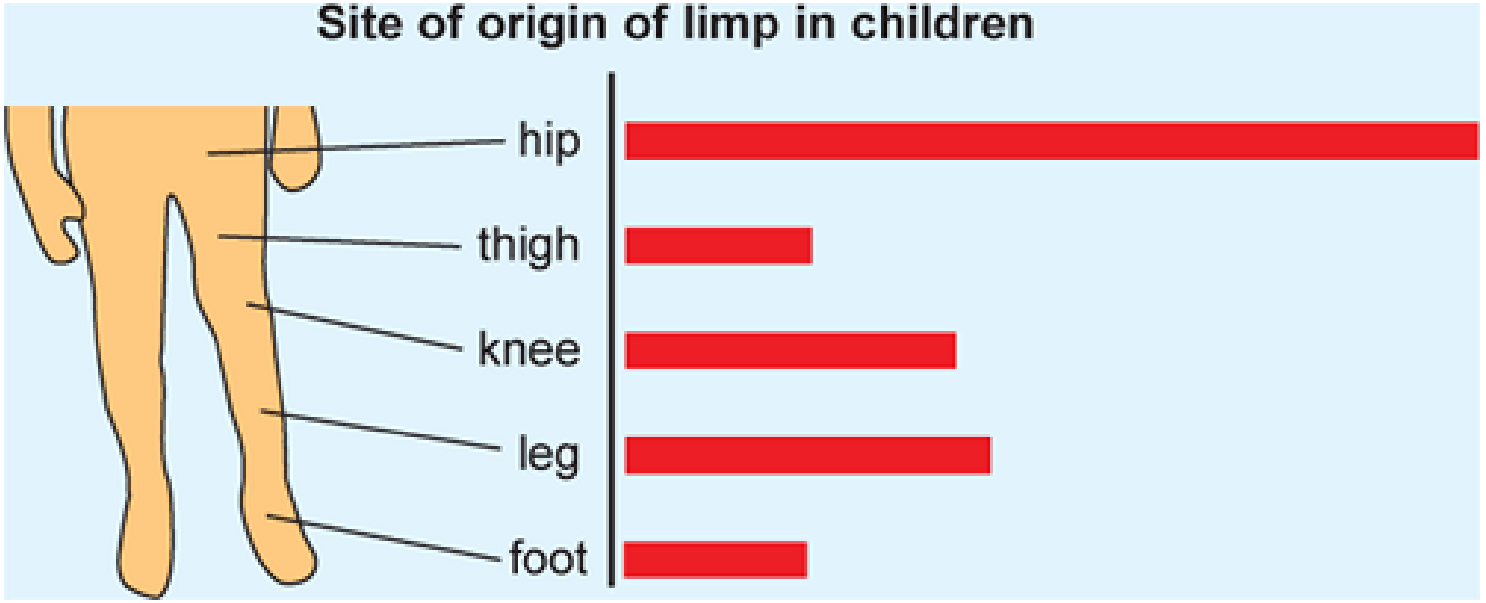
- Limping → an abnormal gait
- Due to:
  - Deformity (bone or joint)
  - Weakness (general or nerve or muscle)
  - Pain (where)
- In one or both limbs

Limping

- Diagnosis by:
  - History (detailed)
  - Examination:
    - Gait good analysis
    - Is it:
      - Above pelvis → Back (scoliosis)
      - Below pelvis → Hips, knees, ankles, & feet
    - Neuro.Vascular

Limping

- Management:
  - Generalization can't be made.
  - Treatment of the cause:



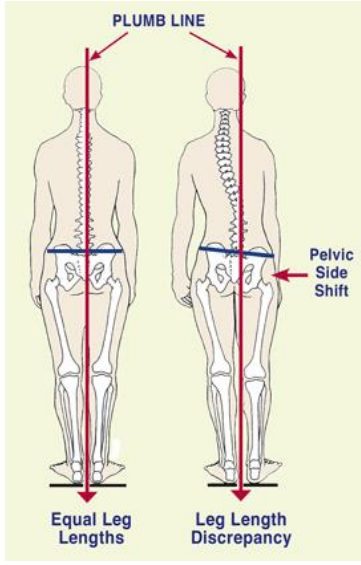
If The Cause Was MSK That Led To Limb Length Inequality

Limb Length Inequality

- True vs. apparent
- Etiology:
  - Congenital → as DDH
  - Developmental → as Blount's
  - Traumatic → as oblique # (short), or multifragmented (long)
  - Infection → stunted growth or dissolved part of bone
  - Metabolic → as rickets (unilateral)
  - Tumor → affecting physis

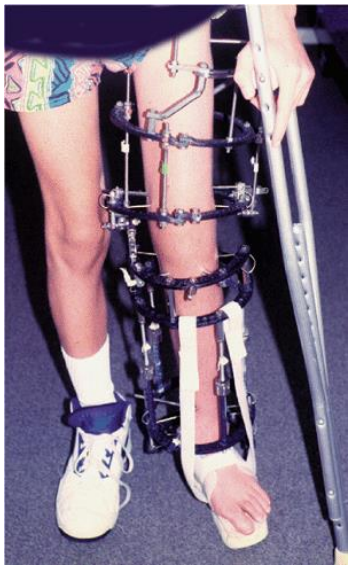
Limb Length Inequality

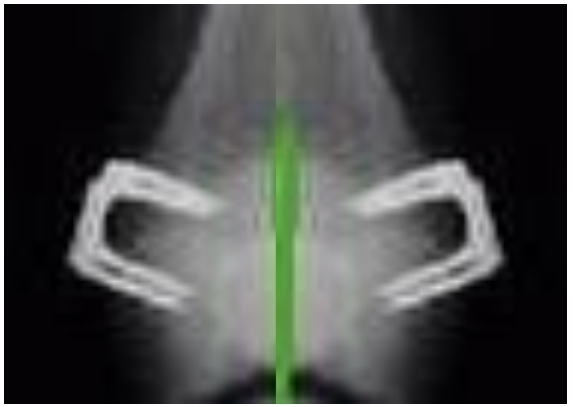
- Adverse effects & clinical picture:
  - Gait disturbance
  - Equinus deformity
  - Pain: back, leg
  - Scoliosis (secondary)
- Evaluation:
  - Screening examination
  - Clinical measures of discrepancy
  - Imaging methods (Centigram)



Limb Length Inequality

- Management depends on the severity (>2cm):
  - For shorter limb:
    - Shoe raise
    - Bone lengthening
  - For longer limb:
    - Epiphysiodesis (temporary or permanent)
    - Bone shortening





6) Leg Aches

Leg Aches

- What is leg aches?
  - "Growing pain"
  - Benign
  - In 15 – 30 % of normal children
  - F > M
  - Unknown cause
  - No functional disability, or limping
  - Resolves spontaneously, over several years

Leg Aches

- Clinical features →
- H/O:
  - At long bones of L.L (Bil)
  - Dull aching, poorly localized
  - Can be without activity
  - At night
  - Of long duration (months)
  - Responds to analgesia
- O/E:
  - Long bone tenderness → nonspecific, large area, or none
  - Normal joints motion

Leg Aches

- D.D from serious problems, mainly tumor:
  - Osteoid osteoma
  - Osteosarcoma
  - Ewing sarcoma
  - Leukemia
  - SCA
  - Subacute O.M

Leg Aches

- Management
  - Reassurance
  - Symptomatic:
    - Analgesia (oral, local)
    - Rest
    - Massage

Any Question ?

Remember

Take Home Message

1. Intoeing → is one of 4 causes, treatment depends on the level, mainly observe, operate >8y old
2. Genu varus & valgus → phys vs. patho, rickets, when operate
3. Blount → early walkers, treatment mainly surgery
4. CTEV → 3 types, treat as young as possible, Ponseti better to avoid surgery
5. L.L in C.P → mainly treat spastic, PT importance, surgery indications
6. Limping → due (pain- week- deformed), above or below pelvis
7. L.L.I → proper assess (cause & level), treated >2cm, options of treat
8. Leg aches → symptomatic treatment

Lecture Objectives

1. Intoeing → level of causes, special tests for each level, know normal angles of rotational profile, treatments, parents education
2. Genu varus & valgus → physiological vs. pathological, rickets clinical & radiological evaluation, when operate
3. Blount → pathology level, types, how to read XR, MRI when needed, surgery
4. CTEV → 3 types, clinical picture, Ponseti treat, surgery options
5. L.L in C.P → types, clinical assessment, treatments
6. Limping → due (pain- week- deformed), uni or bi, proper assessment
7. L.L.I → true vs. apparent, proper assessment to know cause & level, effects if not treated, >2cm, options of treat
8. Leg aches → clinical picture, D.D, treatment