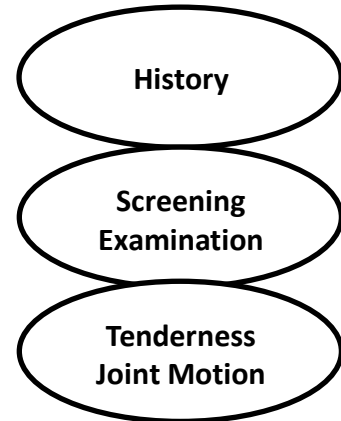


## Common Pediatric Lower Limb Disorders

*The lecture notes will be at page 145*

### ❖ Leg Aches:

- What is leg aches?
  - Growing pain
  - Benign
  - No functional disability
  - Resolves spontaneously
  - Unknown cause
- Clinical features
  - **Diagnosis by exclusion**
- Differential Diagnosis from serious problems mainly tumor
  - Osteoid osteoma
  - Osteosarcoma
  - Ewing sarcoma
- Management
  - Symptomatic
  - Reassurance

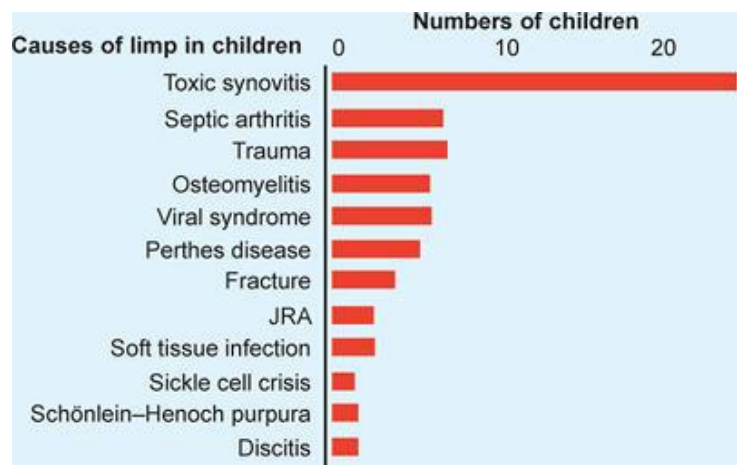


*Imp. Table*

Feature	Growing Pain	Serious Problem
History		
Long duration	Often	Usually not
Pain localized	No	Often
Pain bilateral	Often	Unusual
Alters activity	No	Often
Causes limp	No	Sometimes
General health	Good	May be ill
Physical Examination		
Tenderness	No	May show
Guarding	No	May show
Reduced range of motion	No	May show
Laboratory		
CBC	Normal	± Abnormal
ESR	Normal	± Abnormal
CRP	Normal	± Abnormal

### ❖ Limp:

- **It's a sign of a disease.**
- Abnormal gait due to:
  - pain
  - weakness
  - Deformity
  - Others
- **Most common cause of limp is pain**  
**Due to infection or trauma.**



Group A1

- Limp Evaluation

- History (Mainly age of onset)

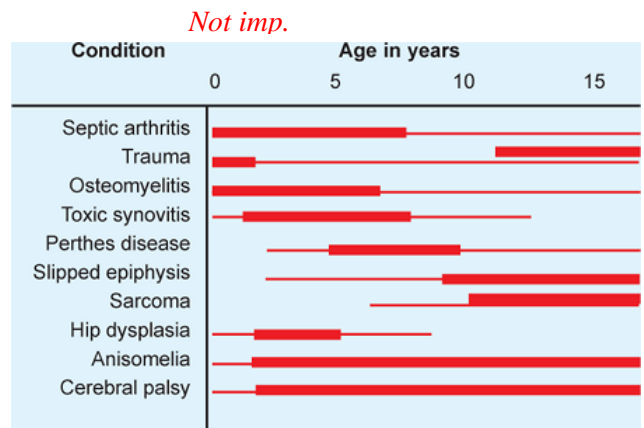
- Observation

- Evaluate the limp by studying the child's **gait** while the child walks in the clinic hallway

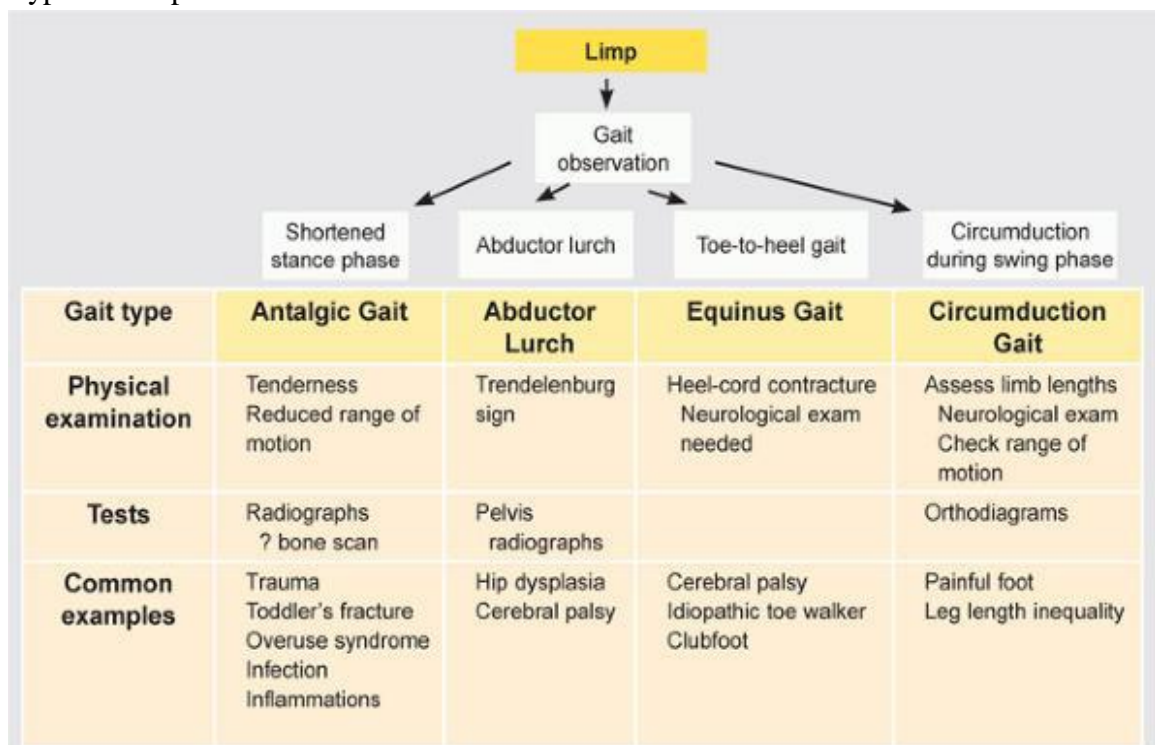
- **Painful gait = Antalgic gait**

**Waddling gait = abductors weakness in both legs.**

**Toe to heel gait (plantar flexion) = Equinus gait.**

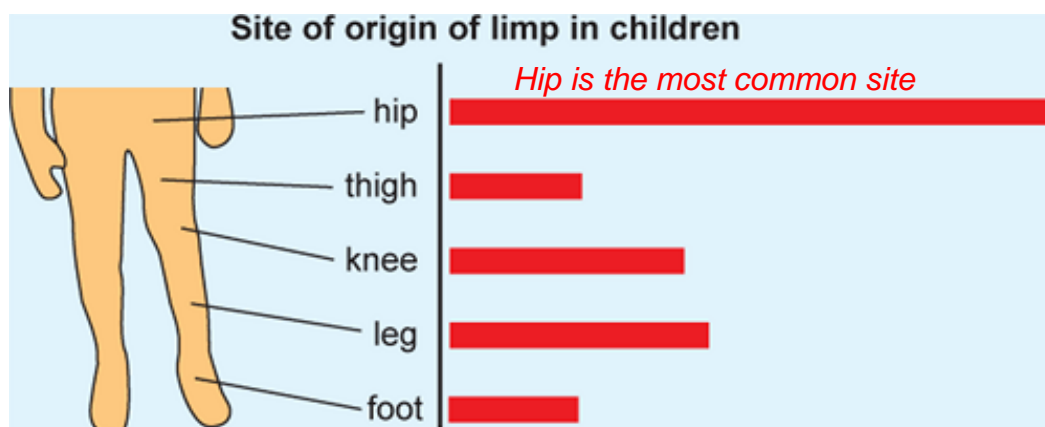


- Types of limp:



- Management

- Generalization regarding management cannot be made
- **Treatment of the cause**



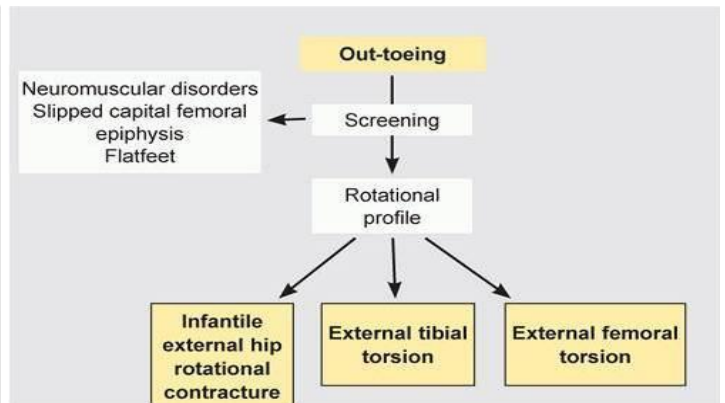
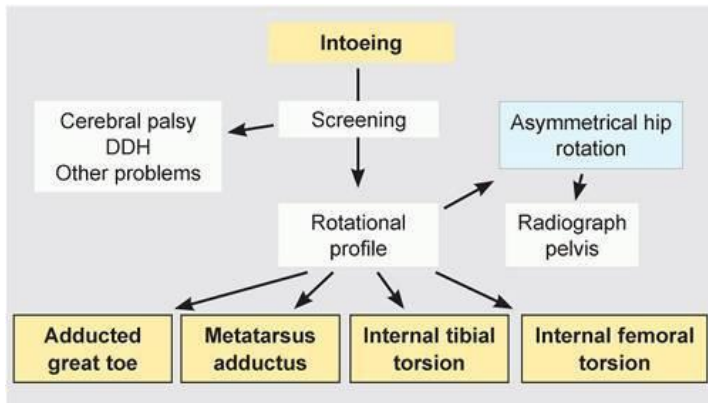
## ❖ In-toeing and Out-toeing:

### ▪ **Terminology**

- Version
  - Describes *normal* variations of limb rotation
  - It may be exaggerated
- Torsion
  - Describes *abnormal* limb rotation
  - Internal or external
  - It may be complex if there is compensatory torsion

### ▪ **Evaluation**

- History
- Screening examination
- Rotational profile



In-toeing and out-toeing Screening Examination:

First do hip examination:

- internal rotation  $\geq 90^\circ$  ( normally= $45^\circ$ ) → the child will present with W shape sitting position ما يقدر يتربع → In-toeing caused by Increased angle of anteversion.
- Increased external rotation → out-toeing caused by retroversion.

If the internal rotation was normal= $45^\circ$ :

In neutral hip rotation look at the patella

- Patella internally rotated → internal femoral Torsion → in-toeing
- Patella externally rotated → external femoral Torsion → out-toeing
- Patella straight → Normal femur

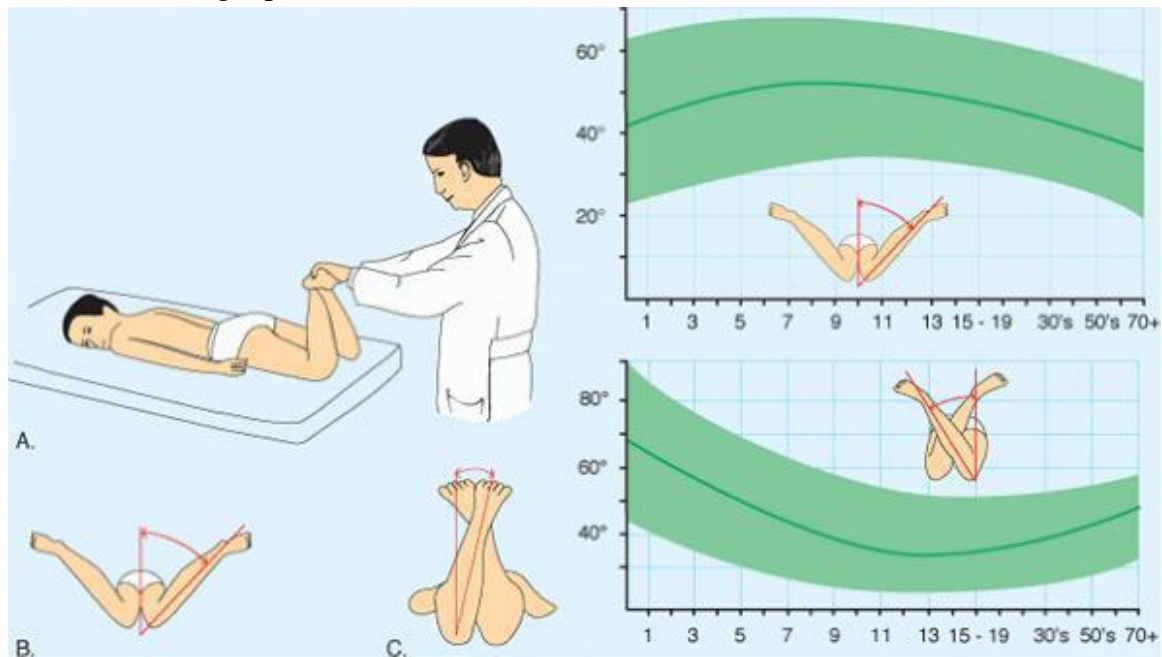
Then Exclude any foot deformity

In prone position with flexed knee

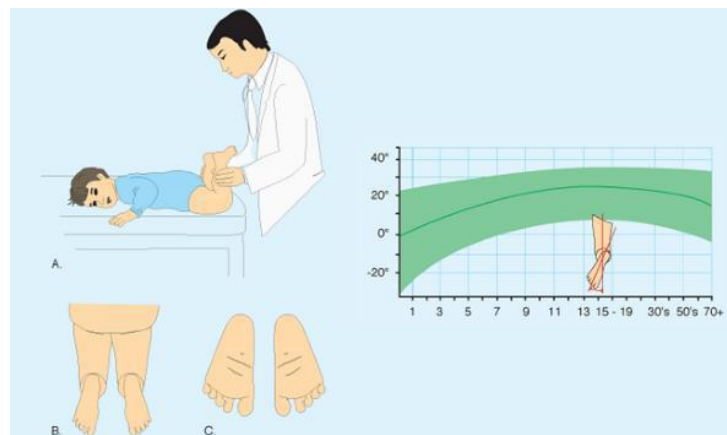
- Direction of heel to sacroiliac joint → Tibia is normal
- Internal → Internal Tibial Torsion
- External → External Tibial Torsion

▪ **Special tests**

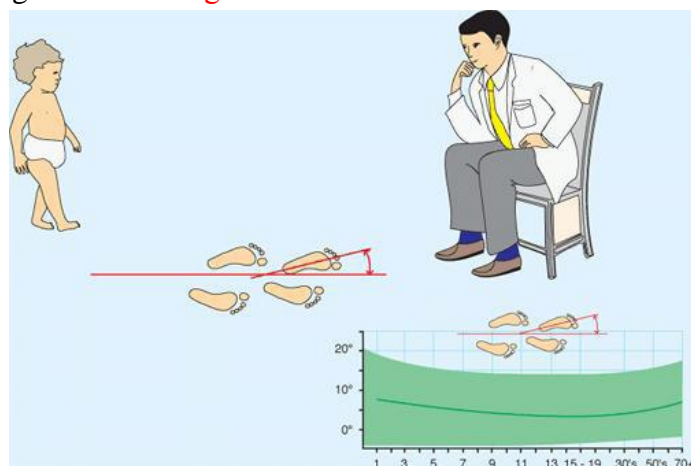
- Assessing hip rotation



- Assessing rotational status of tibia and foot



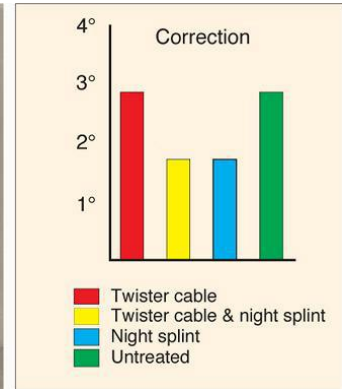
- Foot progression angle: **Normal angle= 15°**



Group A1

- **Management principles**

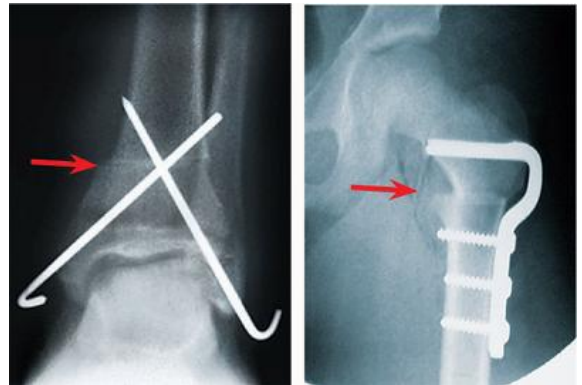
- Establishing correct diagnosis
- Allow spontaneous correction (observational management)
- Control child's walking, sitting or sleeping is extremely difficult and frustrating
- Shoe wedges or inserts are ineffective
- Bracing with twister cables limits child's activities
- Night splints have no long term benefit



- *observational Tx till 8 years → if not corrected → Operative correction.*

- **Operative correction**

- Indicated for children above the age of 8 years with significant cosmetic and functional deformity





❖ **Limb Length Inequality:**

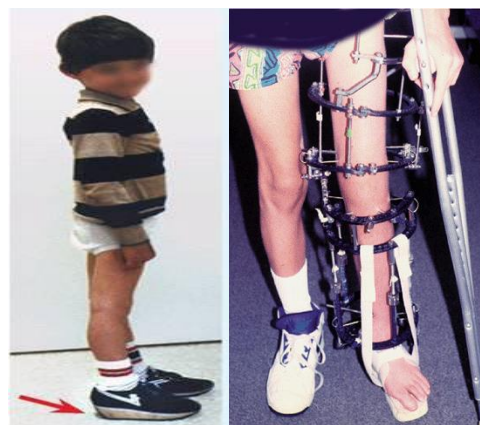
- True and apparent (Apparent: ex. Pelvic obliquity)
  - Etiology

Category	Short	Long
Congenital	Aplasia Hypoplasia Hip dysplasia Clubfoot	Hyperplasia
Neurogenic	Paralysis Disuse	Sympathectomy
Vascular	Ischemia Perthes disease	AV fistular
Infection	Physeal injury	Stimulation
Tumors	Physeal involvement	Vascular lesions
Trauma	Physeal injury Malunion	Fracture stimulation Distraction

- Gait
- Adverse effects *Imp.*
  - Back pain
  - Scoliosis
- Evaluation
  - Screening examination
  - Clinical measures of discrepancy
    - Whole limb: ASIS to medial malleolus.
    - Femur only: ASIS to medial knee joint.
    - Tibia: medial knee joint to medial malleolus.
    - Galeazzi test: if normal → apparent.
  - Imaging methods (Centigram)



- Management principles
  - Severity (mild: shoes raise, after inequality of 2 inches → re-equalize by surgery)
  - Lifts
  - Shortening
  - Epiphysiodesis
  - Lengthening



❖ **Genu Varum and Genu Valgum:**

## ▪ Definitions

- Bow legs = **Genu Varum**
- Knock knees = **Genu Valgum**

Feature	Physiologic	Pathologic
Frequency	Common	Rare
Family history	Usually negative	May occur in family
Diet	Normal	May be abnormal
Health	Good	Other MS abnormalities
Onset	Second year for bowing Third year knock-knees <b>Become normal at 4 yrs</b>	Out of normal sequence Often progressive
Effect of growth	Follows normal pattern	Variable
Height	Normal	Less than 5th percentile
Symmetry	Symmetrical	Symmetrical or asym
Severity	Mild to moderate	Often beyond $\pm 2$ SD

## ▪ Evaluation

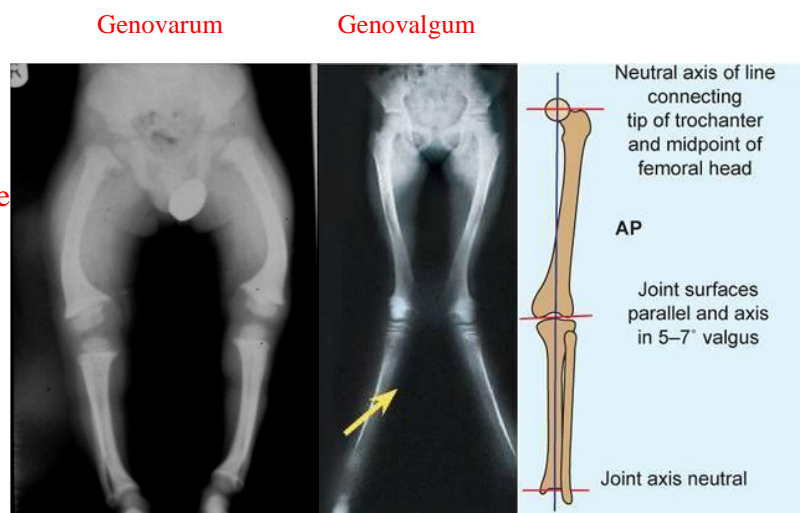
## – Etiology

Cause	Genu Valgum	Genu Varum
Congenital	Fibular hemimelia	Tibial hemimelia
Dysplasia	Osteochondrodysplasias	Osteochondrodysplasias
Developmental	Knock-knee $>2$ SD	Bowing $>2$ SD Tibia vara
Trauma	Overgrowth Partial physeal arrest	Partial physeal arrest
Metabolic	Rickets	Rickets
Osteopenic	Osteogenesis imperfecta	
Infection	Growth plate injury	Growth plate injury
Arthritis	Rheumatoid arthritis knee	

- History
- Examination (signs of Rickets)
- Laboratory
- Imaging

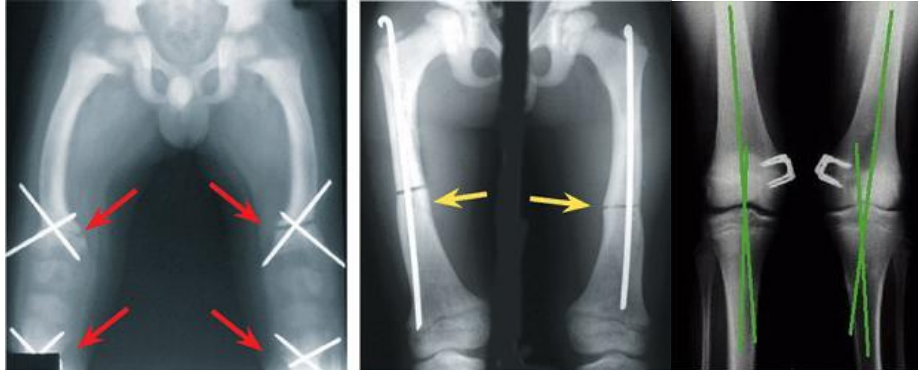
**Mechanical axis:**

- To confirm deformities.
- Continuity of all centers of joints (hip, knee and ankle) should be in straight line.
- if not:
  - 1- Line medial to the knee→genovarus.
  - 2-Line lateral to the knee→genovalgus.

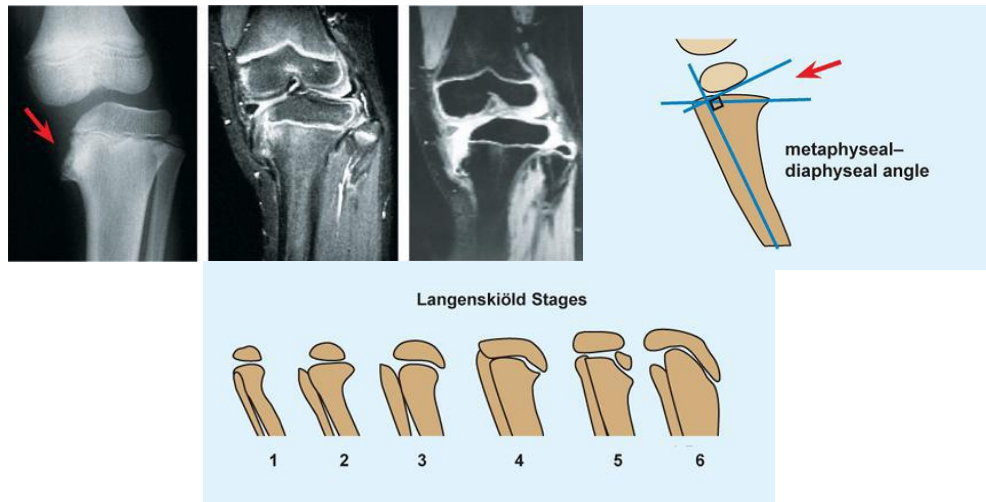


Group A1

- Management principles
  - Nonoperative?
  - Epiphysiodesis
  - Corrective osteotomies

❖ **Tibia Vara:**

- Blount disease
  - Damage of proximal medial tibial growth plate of unknown cause  
(Leading to bow-legs)
  - MRI is the method of choice to differentiate between the stages.

❖ **Clubfoot:**

- Normal foot
  - **Stable:** for supporting the body weight in standing
  - **Resilient:** for walking and running
  - **Mobile:** to accommodate variations of surface
  - **Cosmetic**
- Etiology
  - Postural → if the foot corrected immediately after delivery.
  - Secondary Excluded by general screening of any cause.
  - Idiopathic (CTEV) Diagnosed by Exclusion of postural and secondary causes.





Group A1

- Clinical examination

**Exclude**

- Neurological lesion that can cause the deformity “**Spina Bifida**”
- Other abnormalities that can explain the deformity “**Arthrogryposis**, Myelodysplasia”
- Presence of concomitant congenital anomalies  
“Proximal femoral focal deficiency”
- Syndromatic clubfoot  
“Larsen’s syndrome, Amniotic band Syndrome”

**Characteristic Deformity:****Hind foot**

- Equinus (Ankle joint) **plantar flexed**
- Varus (Subtalar joint) **heel in varus**

**Fore foot**

- Forefoot Adduction
- Cavus **high arch foot**
- Short Achilles tendon
- High and small heel
- No creases behind Heel
- Abnormal crease in middle of the foot
- Foot is smaller in unilateral affection
- Callosities at abnormal pressure areas
- Internal torsion of the leg
- Calf muscles wasting
- Deformities don’t prevent walking



- **Management**

- **The goal of treatment for clubfoot is to obtain a plantigrade foot that is functional, painless, and stable over time**
- **A cosmetically pleasing appearance is also an important goal sought by the surgeon and the family**
- Manipulation and serial casts
  - Validity, up to **12 months!**
  - Technique “**Ponseti**”
  - Avoid false correction
  - When to stop?
  - Maintaining the correction
  - **Follow up** to watch and avoid recurrence
- Indications of surgical treatment
  - Late presentation, **after 12 months** of age!
  - Complementary to conservative treatment
  - Failure of conservative treatment
  - Residual deformities after conservative treatment
  - Recurrence after conservative treatment
- Types of surgery
  - Soft tissue release (**if there’s no bony deformity**)
  - Bony (**osteotomy**)
  - Salvage (**if the child > 12 years**)

❖ **Lower Limb Deformities in CP Child:****Physiological classification**

- Spastic
  - Athetosis
  - Ataxia
  - Rigidity
  - Mixed
- 
- Hip
    - Flexion
    - Adduction
    - Internal rotation
  - Knee
    - Flexion
  - Ankle
    - Equinous
    - Varus or valgus
  - Gait
    - Intoeing
    - Scissoring
  - Management principles
    - Multidisciplinary
  - Options of Surgery
    - Neurectomy
    - Tenotomy
    - Tenoplasty
    - Muscle lengthening
    - Tendon Transfer
    - Bony surgery Osteotomy/Fusion

**Topographicclassification**

- Monoplegia **one limb**
- Paraplegia **two lower limb**
- Hemiplegia **one upper + one lower**
- Triplegia **three limbs**
- Quadriplegia or tetraplegia  
**With trunk**
- Bilateral hemiplegia  
**Upper more than lower, without trunk**
- Diplegia  
**Lower more than upper, without trunk**



**Common Pediatric Lower Limb disorder lecture Note**

**Notes:**

- Terminology is Important
- Femoral antiversion is normal in the Femur bone only
- Torsion is abnormal at the Tibial Bone
- In-Toeing is more common than Out Toeing
- Metatarsus adduction may called: forefeet adduction

**Special Test:**

◆ Assessing hip Rotation:

- Prone Position better so, the Femur will be supported
  - If Internal rotation = Rotation --> NORMAL
  - If Internal rotation More than Rotation --> In-Toeing
  - If Internal rotation less than Rotation --> Out-Toeing
- W-sitting position: Internal rotation --> Lead to In-Toeing ( Prevent the child from sitting like this )  
If the Patient is walking, In-Toeing, Patella Facing Forward --> Means Tibial Problem

◆ Thigh-foot Axis

◆ Foot-Progression angle:

- Number 7 is the normal position
- Number 11 is beginning of In-Toeing
- Number 8 is sever Rotation

**Note that:**

**In-Toeing could be Hemilateral**

**Tibial Correction is done by surgery**

• **Limb Length InEquality: (LLI) or discrepancy:**

HemiHypertrophy --> the only condition that is long, Mostly is shortening

• **Genu Varum, Genu Valgum**

Since the baby is born, Normal position is Varus (o-2 years)

From (2-4 years) is Valgus

Then when the max Valgus is reached, the normal Return (there is a little Valgus Remaining)

• **Tibial Vara:**

From Hip --> Knee is normal

Blount Disease: only happen to patient who walk

Group A1

- Club Foot:

Etiology

- May be Neurological Disease: lead to strong muscle in one side and weak in the other side
- If it is stretchable then it is a Postural Disease
- Idiopathic: there is no neurological Defect

There is Supination in the Fore-Foot

- Cerebral Palsy:

- ◆ Brain Insult During Two First years of life

- ◆ Types:

- Physiological
- Topographic
- Distress during Delivery, Uterine Contaction ( HR Decreased lead to CP+ breech Position ) must do C-section

Depending on the site affected in the brain.

- Most common orthopedics problems associated with CP:

1. Hip: will be flexed, tight adductors + internal Rotation
2. Knee: will be flexed ( tight Hamstring )
3. ankle: equinovarus ( tight tendon achilles )

Examine all Then rehabilitation

**Done !**

