Common Pediatric Orthopeadics

Risk management

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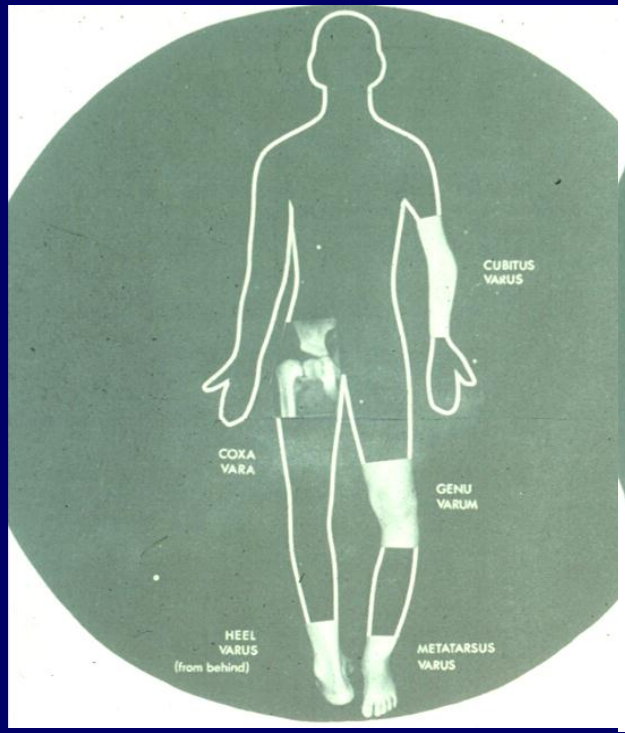
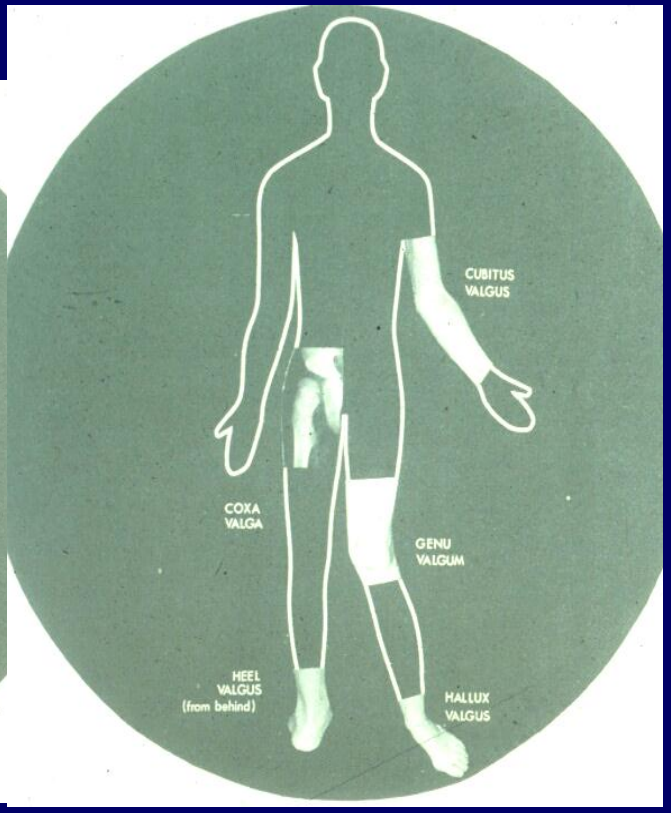
Terminology





Terminology

Table I Terminology of foot and ankle movement

Joint	Movement	Deformity
Ankle	Dorsiflexion	Calcaneus
	Plantar flexion	Equinus
Subtalar	Inversion	Varus
	Eversion	Valgus
Mid tarsal	Abduction	Abduction
	Adduction	Adduction
	Pronation	
	Supination	

Pediatric Orthopaedic

- The Infant
- The Toddler
- The Child

The Infant

Common problem

1. Congenital malformation
   (Manufacturing defect)
2. Postural deformities (defect)
   (Packaging defect)

Packaging defect

Packaging defect

(Postural defect)

1. Prenatal defect

Packaging defect

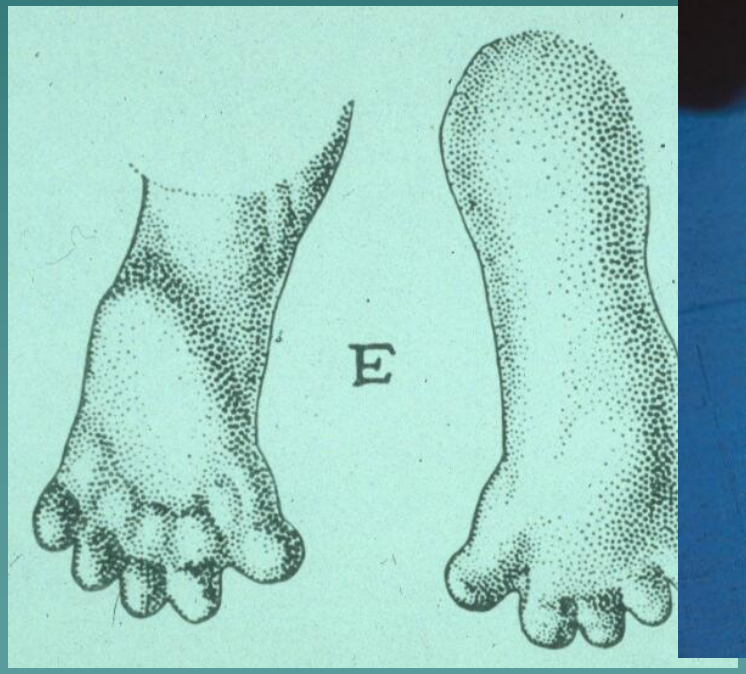
2. Postural defect

(Postnatal)

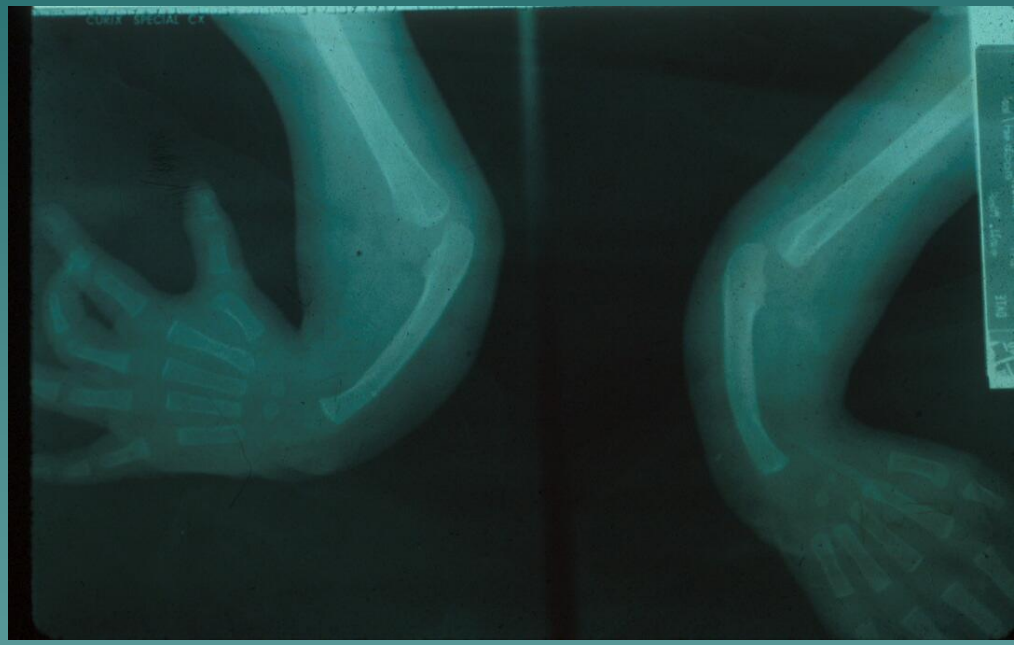
Packaging defect

Post natal defect (cont.)

Manufacturing defect



Manufacturing defect



Normal Posture at Birth

- Spine

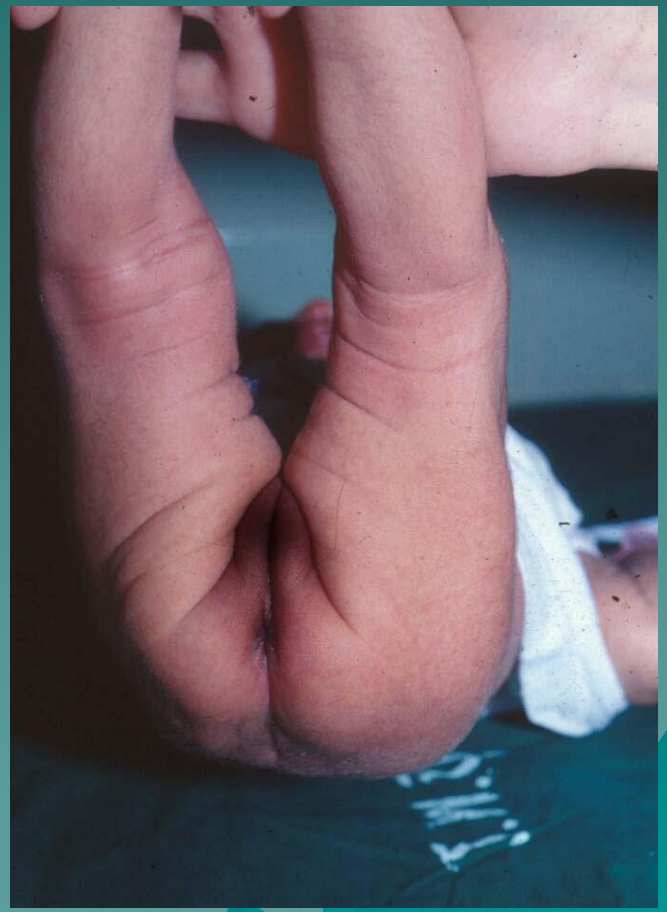
Normal posture at birth

- Hip (flexion contracture 20º)

Normal posture at birth

- **Knee**

(Flexion contracture 20º)



Normal posture at birth

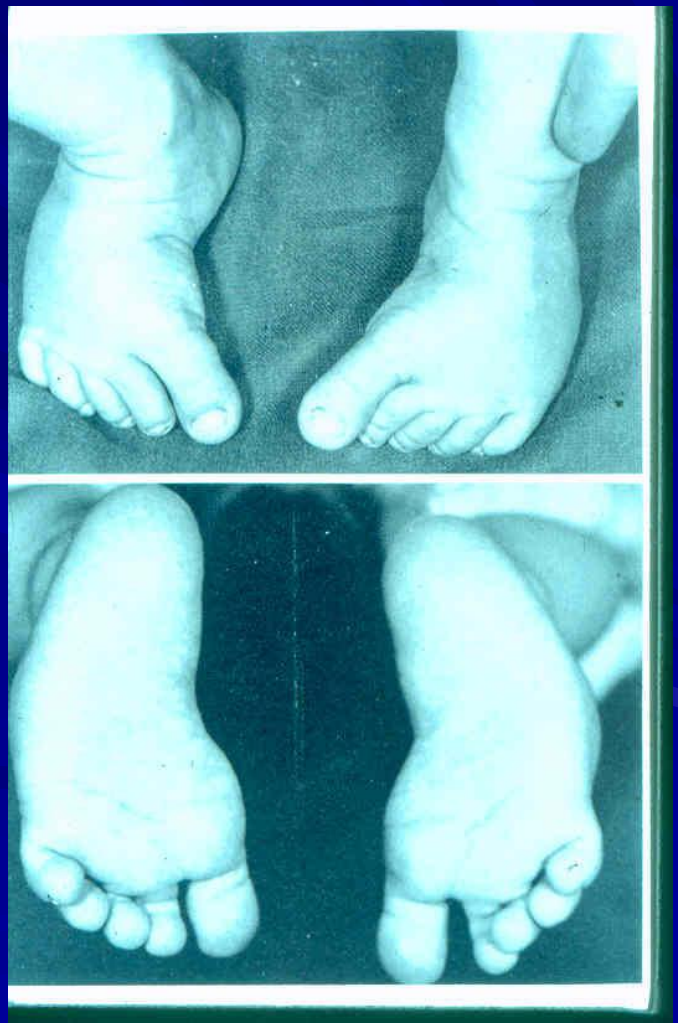
- Tibia

Packaging defect

Foot

Packaging defect

Metatarsus varus

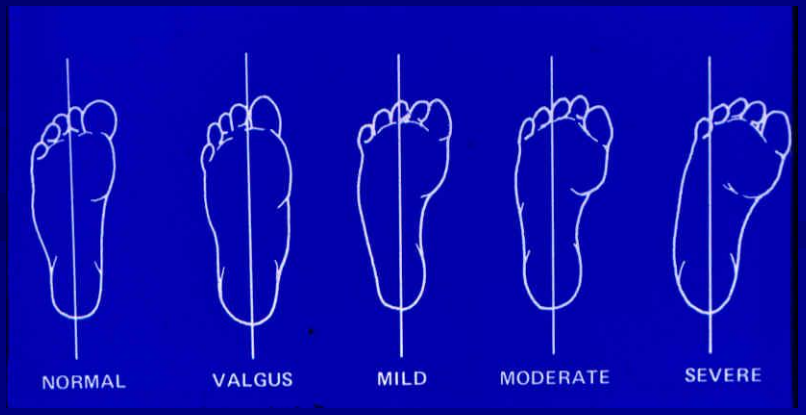


Packaging defect

Metatarsus varus

Diagnosis

Heel bisector



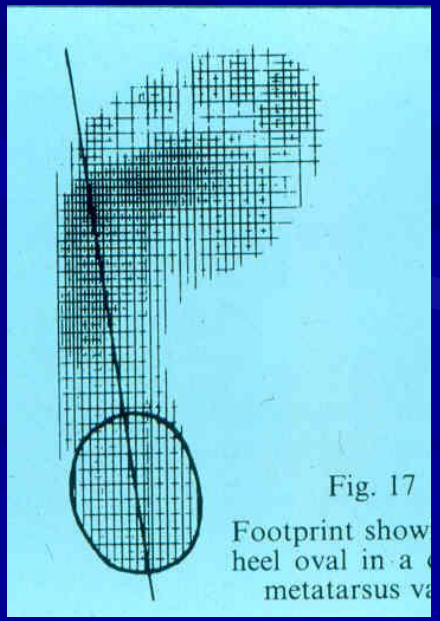
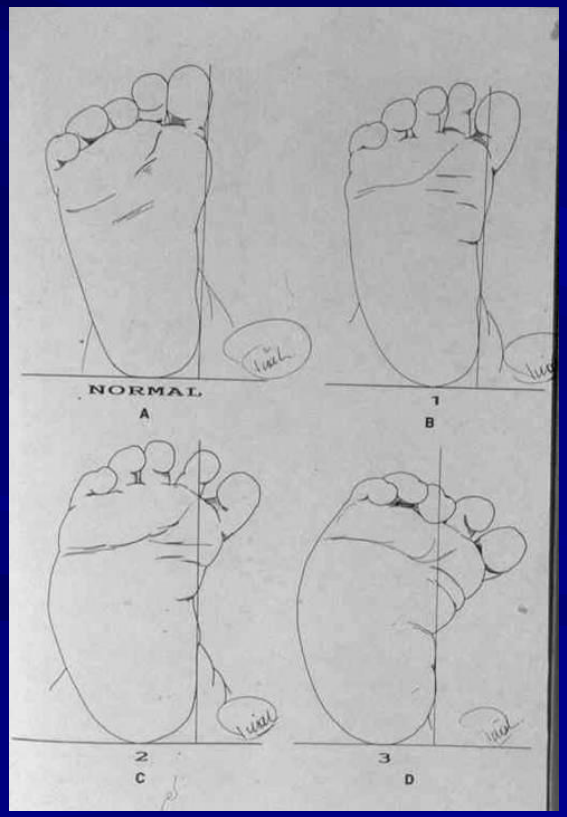


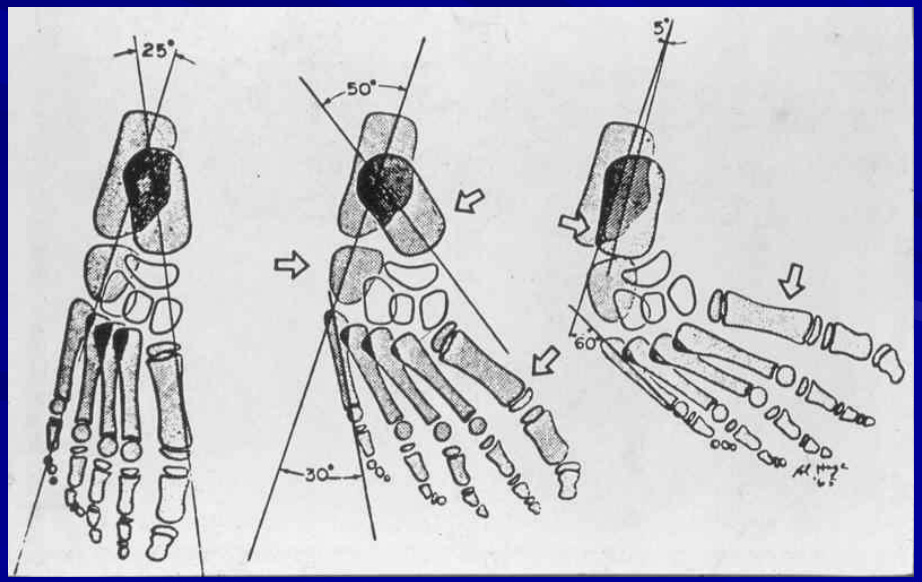
Fig. 17
Footprint show
heel oval in a
metatarsus va

Metatarsus varus

Diagnosis

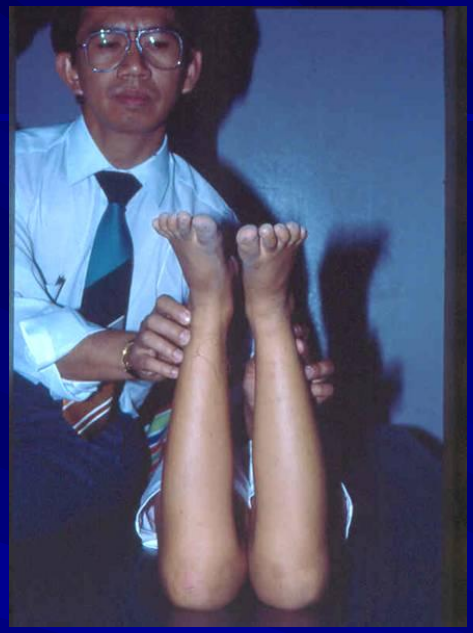


Clinical assessments
& X-ray



Metatarsus varus

Clinical diagnosis &evaluation



Metatarsus varus

- Clinical diagnosis &evaluation

Metatarsus primus varus

Metatarsus varus

Management

- Natural history
- Spontaneous resolution
- Stretching exercise
- Casting
- Shoe modification

Metatarsus varus

- Natural history
  - Spontaneous resolution
  - Persistent deformity

Management

Clinical assessment : Severity vs. prognosis

Metatarsus varus

Management

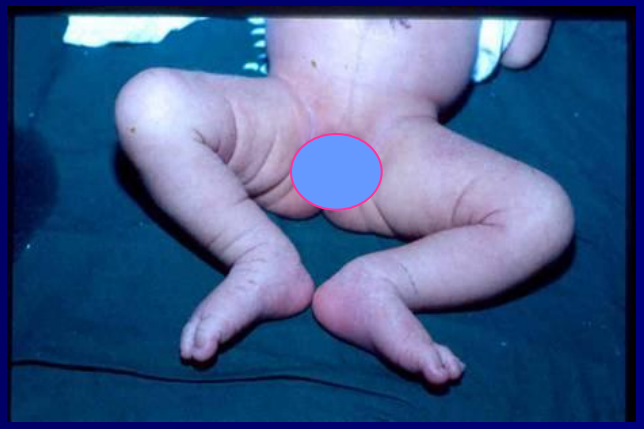
Prevention

Table II Ponseti & Becker (J Bone Joint Surg. 48-A;1966:702)

year	metatarsus adductus (varus)	clubfoot
1910-1920	2	126
1921-1930	12	299
1931-1940	49	361
1941-1950	201	360
1951-1960	267	347
1961-1963	105	78

Metatarsus varus

- Prevention



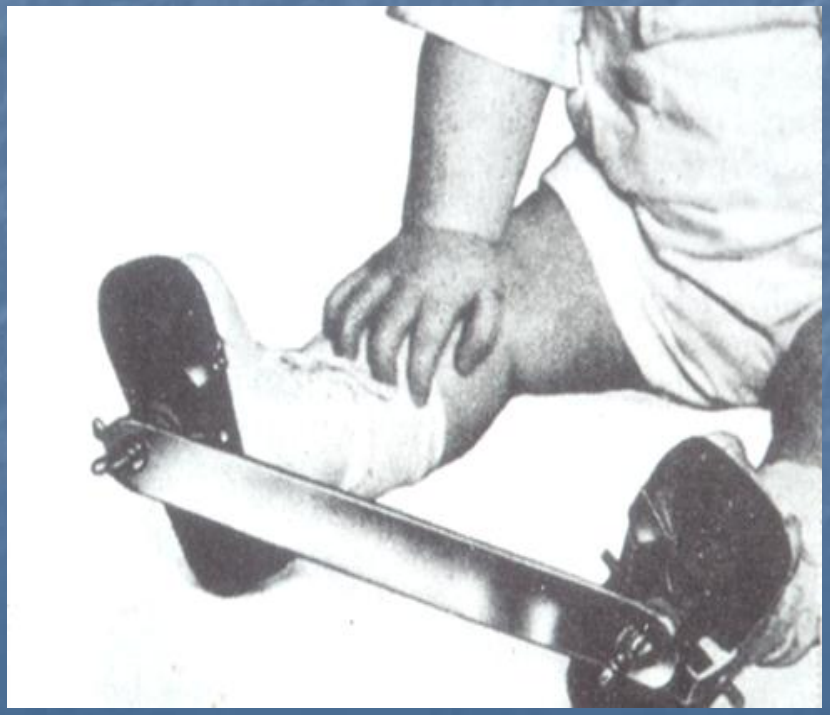
Metatarsus varus

Management : The infant

Spontaneous resolution

Metatarsus varus

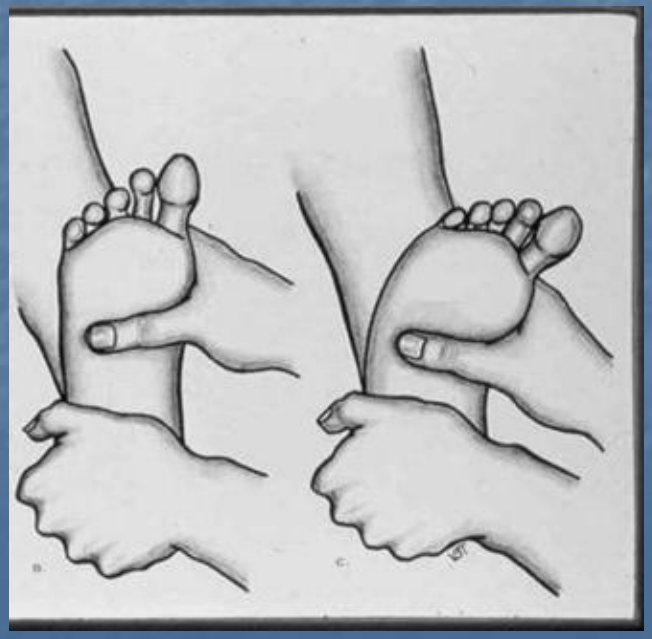
- Management
- Dennis Brown sprint



Metatarsus varus

Management :The infant

- Manipulation
- Manipulation& casting

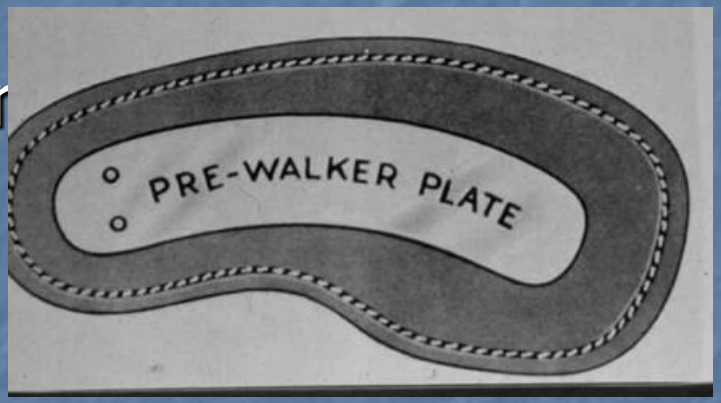


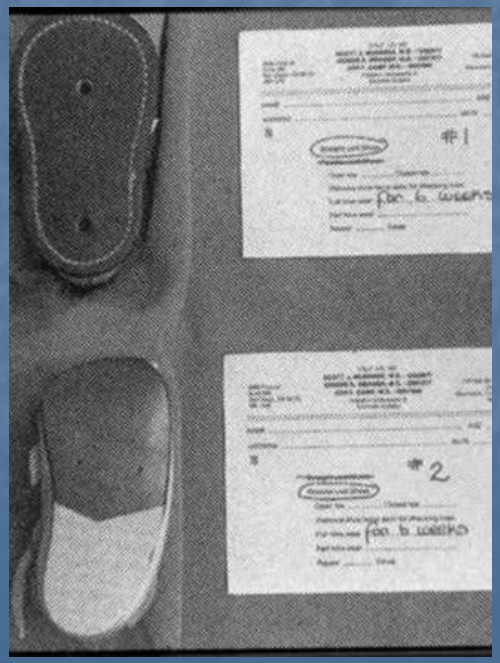
Metatarsus varus

The child

Management

Shoe modificatior





Metatarsus varus

- Why not shoe modification ?
- Bonsai?

Metatarsus varus

The child

- Management
- Surgery

Drawback of corrective shoes &shoes modification

- Inferiority complex in body image & self-esteems

Packaging defect

Postural clubfoot

Packaging defect

- **Postural clubfoot**
- **Differential diagnosis**

Packaging defect

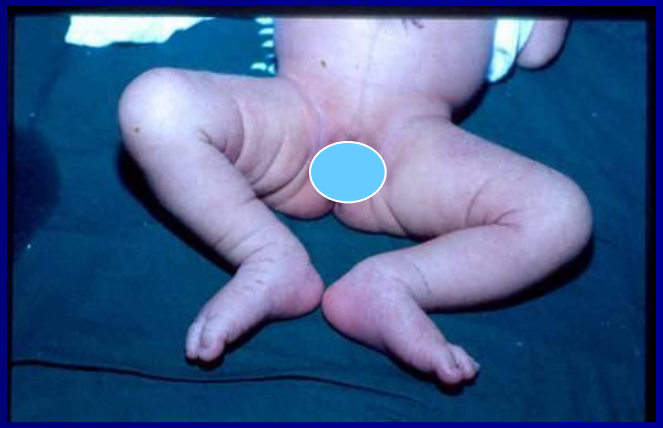
- Management
- Spontaneous resolution
- Manipulation& casting

Packaging defect

- Postural talipes calcaneovalgus

Talipes calcaneovalgus

- Management
  - Spontaneous resolution



Postural talipes calcaneovalgus

- Management
- Manipulation & casting

Genu recuvatum

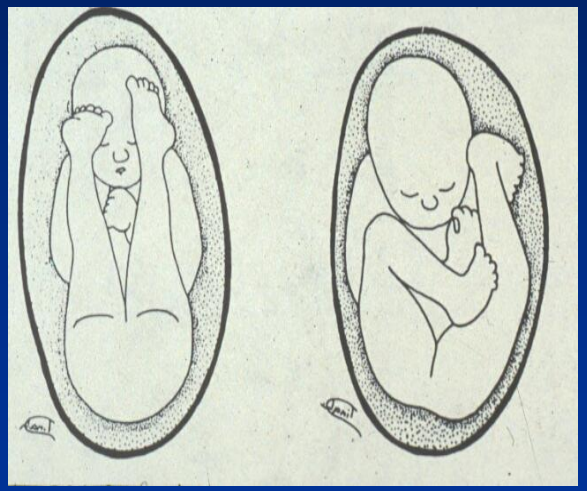
Genu recurvatum

Differential diagnosis

1. Postural genu recurvatum
2. Congenital dislocation of patella
3. Congenital dislocation of knee joint

Packaging defect
Genu recurvatum

Etiology



Genu recurvatum

Management : Differential diagnosis

Grade 1 hyperextension 15-20°

Grade 2 hyperextension 25-45°

Grade 3 hyperextension >45°

Genu recurvatum

Manipulation & serial casting

Genu recurvatum

Surgery

Pre & post natal packaging defect

External rotation of the hip

External rotation of the hip

External rotation of the hip

Etiology

- Short hip external rotator

External rotation of the hip

- **Management**

almost always complete resolution

Because 60% of gait cycle are internal rotate

External rotation of the hip

In children

looking for neuromuscular disorder

Packaging defect
Post natal defect

Mold child syndrome

Clinical picture

1. Plagiocephaly
2. Bat ear
3. C-shape scoliosis
4. Asymmetric rib cage
5. Hip adduction contracture

Mold child syndrome

Plagiocephaly

Mold child syndrome

C-shape scoliosis

Mold child syndrome

- Hip adduction contracture

Manufacturing Defects

- Rigid (Idiopathic) club foot

Natural History

- Persistent deformity

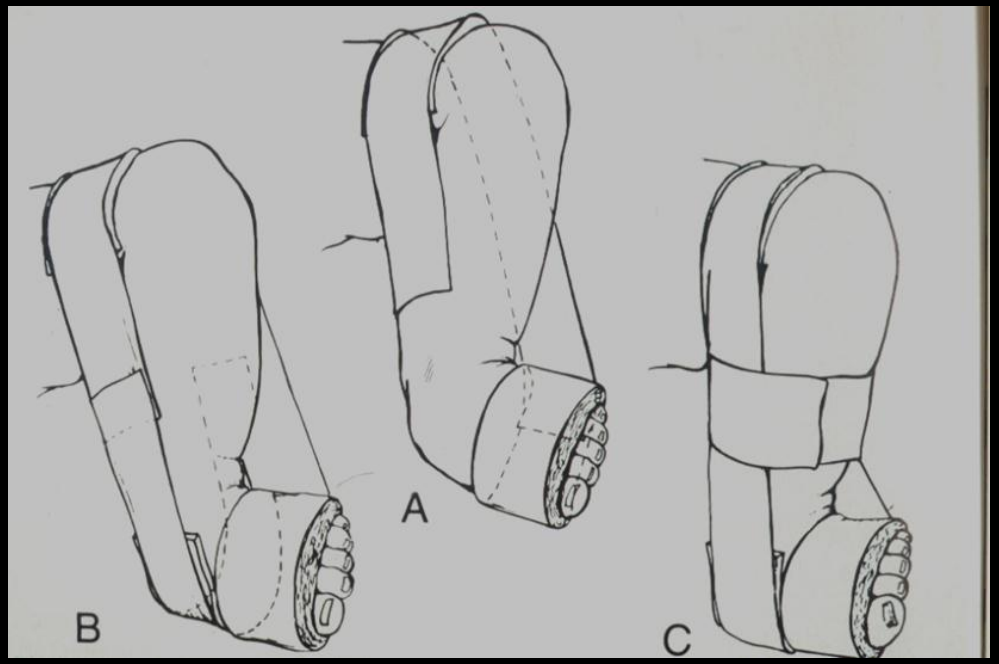
Manufacturing Defects

- Rigid clubfoot
  - Conservative
    - (Manipulation & taping & Casting
    - Manipulation & DB. splint
  - Surgery

Rigid club foot

Conservative

taping



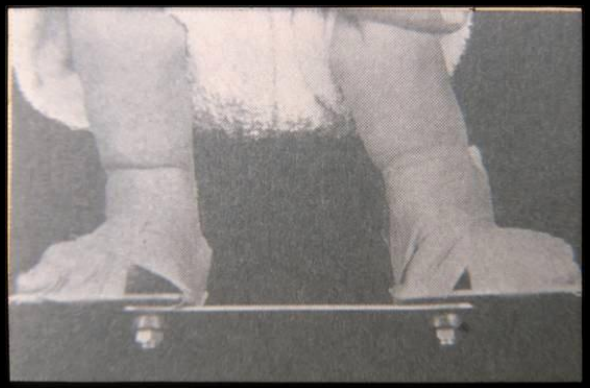
Rigid club foot

casting

Rigid club foot

Conservative treatment

strapping & DB. splint



Rigid club foot

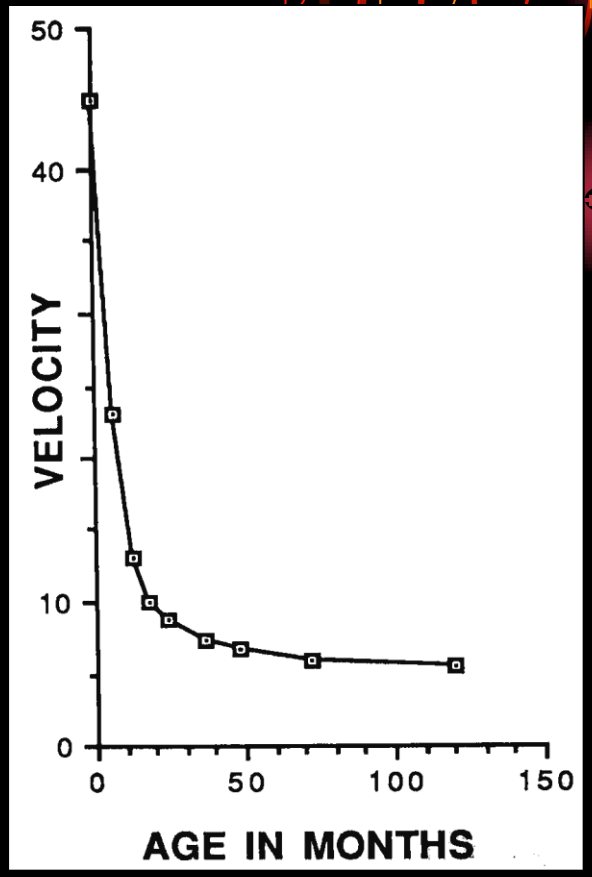
- External fixator

Surgery

Timing for Surgery

9 Months

(I prefer)



Rigid club foot

surgery

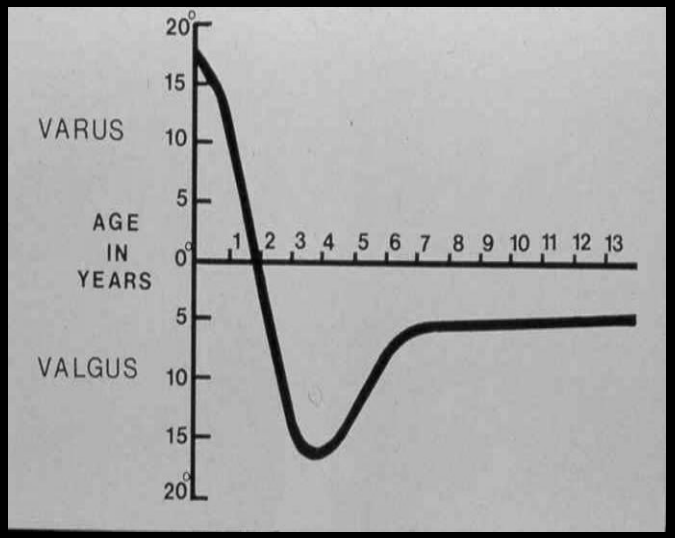
Gait abnormality

Standing posture
2 years olds

1. Wild base
2. Toe-out
3. Lumbar lordosis
4. Bulging belly
5. Flexed hips, flexed knees

Normal gait

- Start at 2 years
- Complete at 7 years



Abnormal gait

Toe-in gait

Toe-in gait

- Etiology

1. Increase femoral ante version
2. Increase internal tibial torsion
3. Metatarsus varus
4. Neuromuscular disorder
5. Gait compensation

Toe-in gait

- Increase femoral ante version

Toe-in gait

- Increase internal tibial torsion

Toe-in ga

- Metatarsus varus

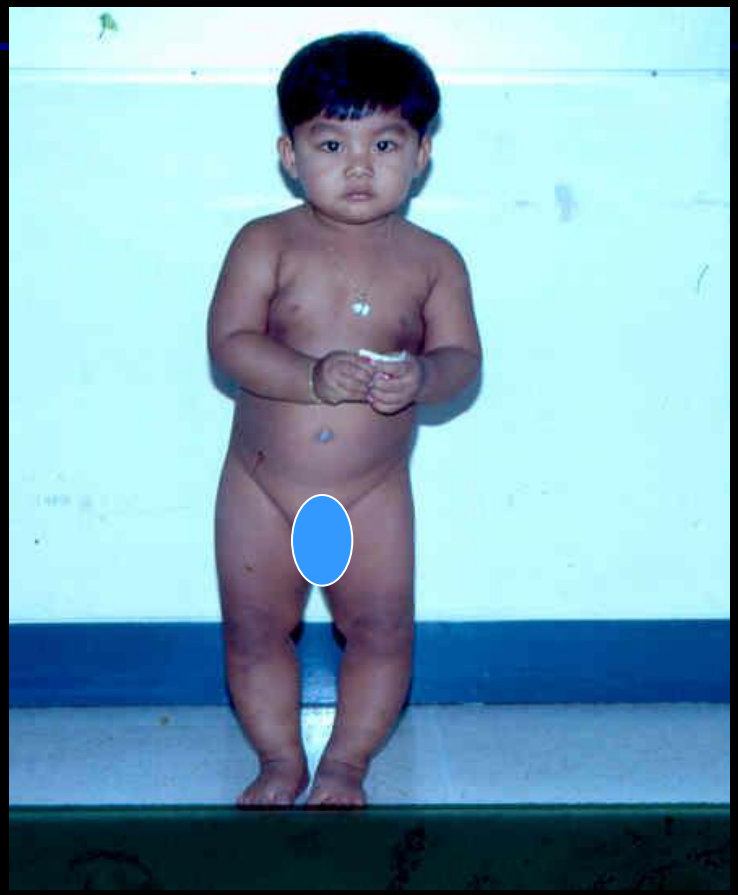
Toe-in gait

- Neuromuscular disorder

Toe-in gait

- Compensatory gait

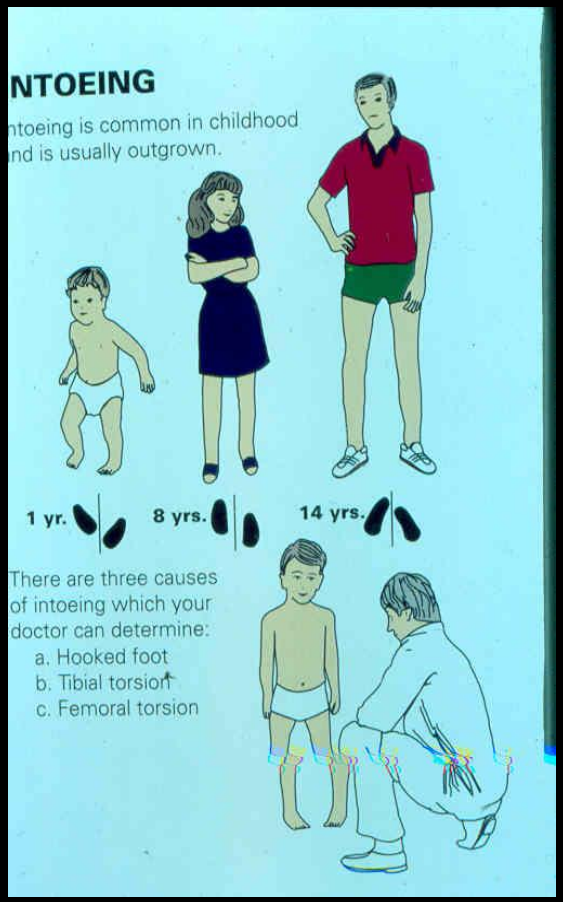
Bow leg



Toe-in gait

management

- Natural history



Toe-in gait

- Management

1. Increase femoral ante version

Spontaneous resolution

Toe-in gait

2..Increase internal tibial torsion

very rarely

Toe-in gait

3. Metatarsus varus

↓

Spontaneous resolution

Toe-in gait

4.Neuromuscular disorder

consult

Toe-in gait

5.Bow leg

Spontaneous resolution in 2 years.

Toe-out gait

Toe-out gait

Cause of toe-out gait

1. Normal posture of the toddler
2. External rotation of tibia
3. Talipes calcaneovalgus
4. Compensatory gait

Toe-out gait

1. normal posture of the toddler

Complete resolution

Toe-out gait

2. External rotation of tibia

↓

Neuromuscular disorder

(Spinabifida)

↓

consult

Toe-out gait

Talipes calcaneovalgus

Almost always complete resolution

(except neuromuscular & congenital joint laxity)

Toe-out gait

Knock knees

symmetry

Complete resolution

except → 

(Consult)

flatfoot

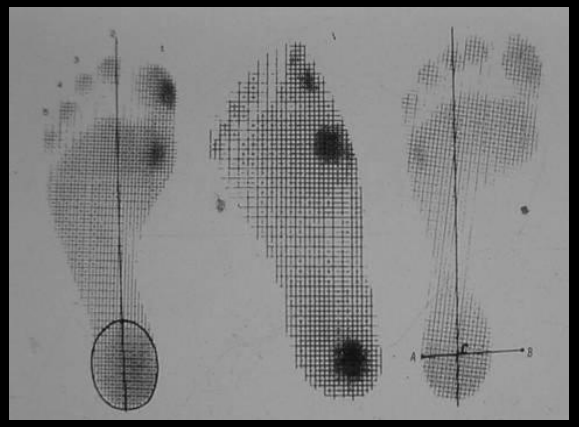
What is “Flat Foot” ?

Which one is flat foot ?

Foot print

Diagnosis

Foot print



Foot Print

The problem of foot print

Physical Examination

- A brief neurological examination
  - DTR
  - Muscle tone (R/O CP)
  - Spine for possible skin defects, scoliosis

Physical Examination

- Inspect and palpate the arch with the child weight-bearing.

Flat foot

Hick's test

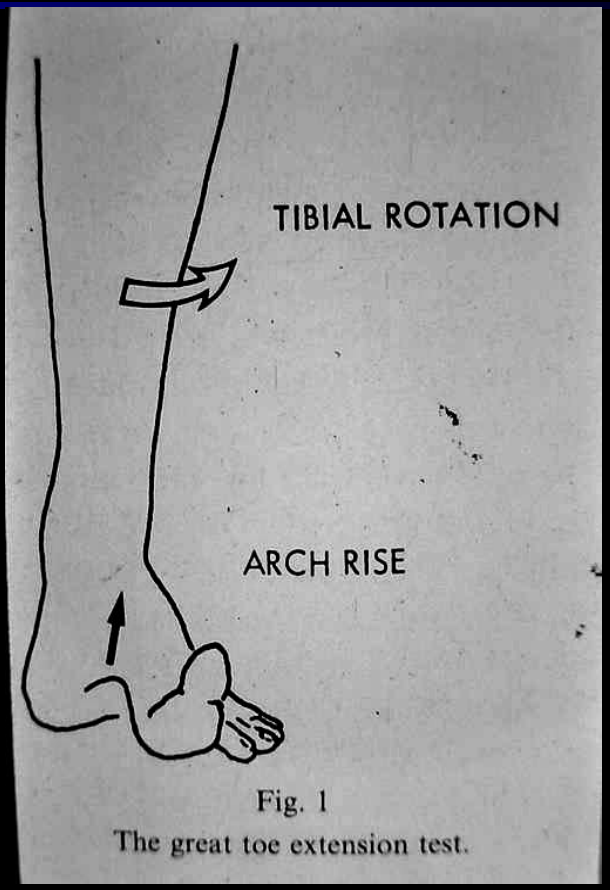


Fig. 1
The great toe extension test.

Flat foot

- Hick’ s test

Flat foot

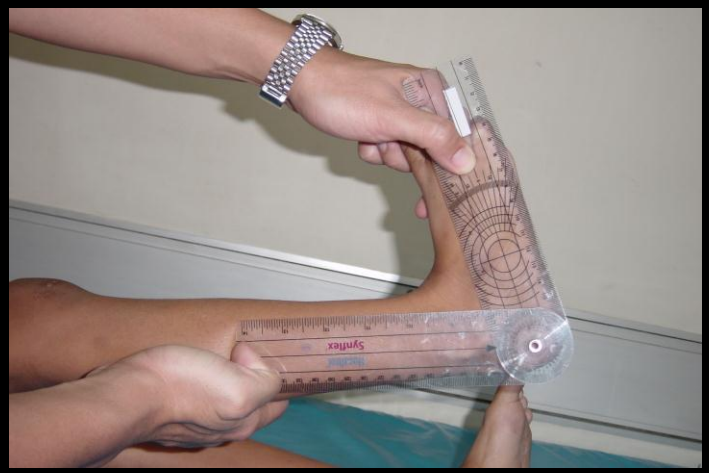
The other test

Flat foot

Physical exam in children

Physical Examination

- Tight heel-cord
  - Lock talonavicular joint in to inversion before passively dorsiflex the foot.



X-ray

Why Flat Feet

Needed Treatment ?

Flat Foot Problem

- Foot pain
- Shoe wear and tear
- Cosmetics

Are All Flat Foot Need Treatment?

Flat foot (cosmetics)

The parents are justifiably concerned because often they had been treated in childhood for the same condition.

Flat foot

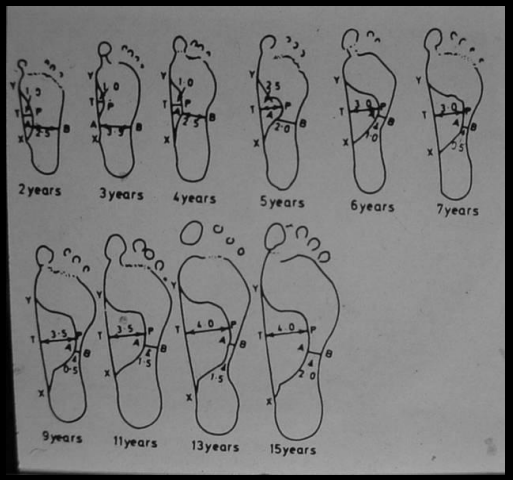
They assume their improvement resulted from treatment and now want the same for their child, only earlier and better.

Natural History

- Children between age 1-4 years have flatfeet, because a deposit of fat in the medial arch.

Natural History

- Many authors have noted the gradual spontaneous development of foot arch in children.



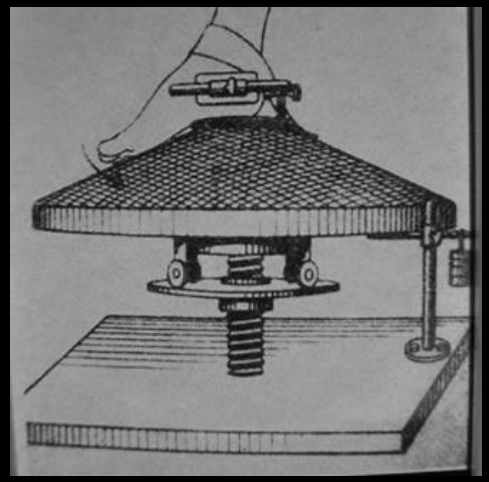
Natural History

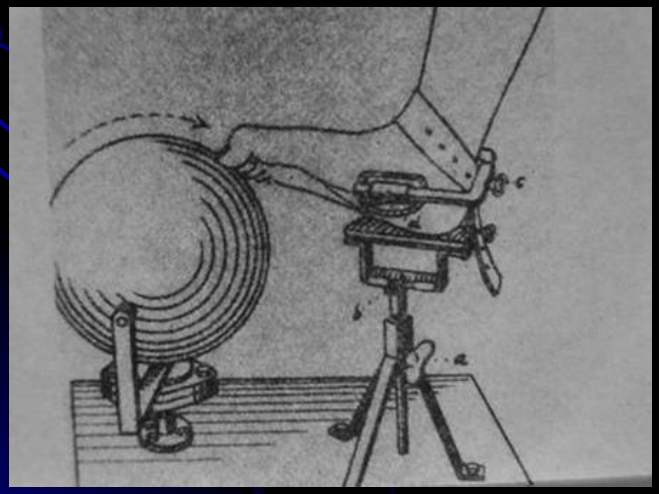
- A review of Canadian soldiers suggested an incidence of 14% flatfeet in young adult recruit.

Flatfoot Management

Evolution of Treatment

Evolution of treatment





Current Concept of Flatfoot Management

R/O Pathologic flatfoot

- Congenital vertical talus
- Tight heel cord

Flexible Flatfoot

management

Management of Flexible Flatfoot

- Child with few or no symptoms
  - It will improve over time, whether or not it is treated.

Wenger DR, et al. (JBJS 1989;71A:800-810)

- Prospective randomized trial of flatfoot treatment in children age 1-6 years.
- The arch improved to the same degree in all groups.

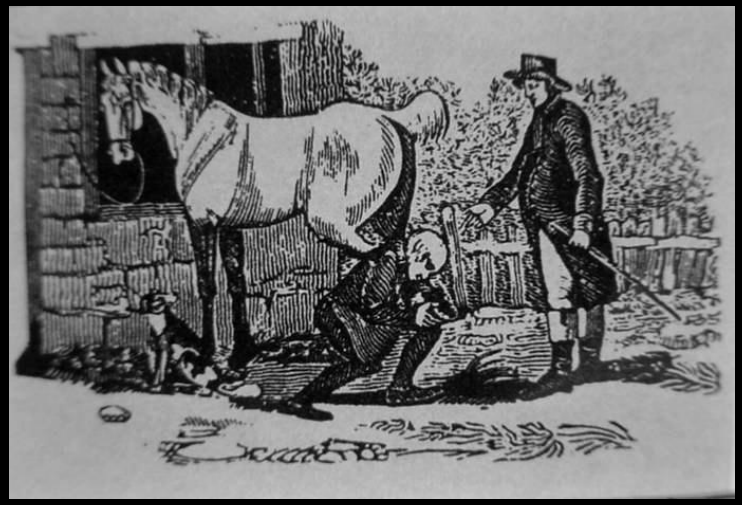
Management of flexible flat foot

The flatfoot in untreated control patients had clear radiographic improvement in the longitudinal arch between age 1 and 6 years.

Flatfoot Management

- Conservative Rx
  - Shoe modification
  - UCBL plastic shoe insert
- Surgery
  - For symptomatic flexible flatfoot

Corrective Shoes

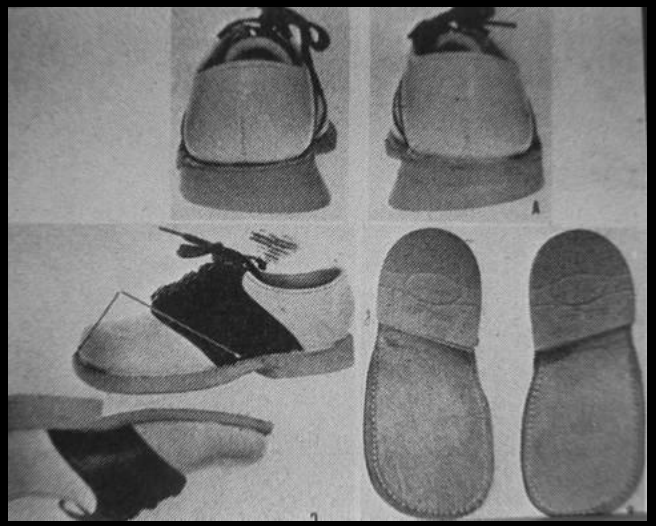


Corrective Shoes

- Medial heel wedge
  - correct heel varus)
- Outer (lateral) sole wedge
  - correct pronate forefoot
- Navicular arch support (cookie or navicular pad)
- Strong medial counter

Corrective Shoes

- Sturdy high-top leather shoe with an extend medial counter, Thomas heel and scaphoid pad.



Flat foot management

Plastic shoe insert

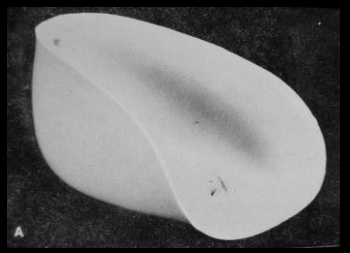
1. Custom-molded
2. Helfet
3. UCBL
4. Whitman plate

Plastic shoe insert

Custom- molded

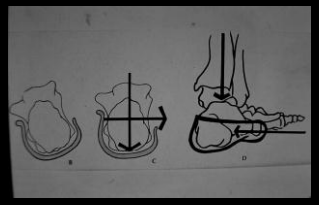
Plastic shoe insert

Helfet Heel Cup



Plastic shoe insert

UCBL plastic shoe insert

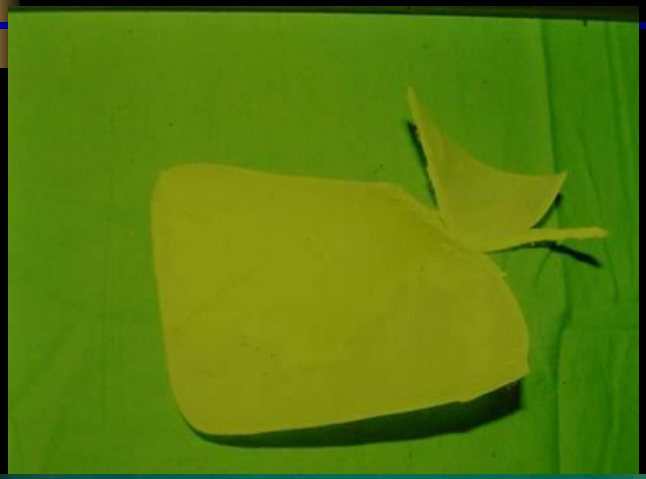


UCBL plastic shoe insert

UCBL plastic shoe insert

Although an arch support can actually improve the arch with weight-bearing, it is unclear how long this effect lasts in an active 2-5 year-old child, the most common age for flatfoot treatment.

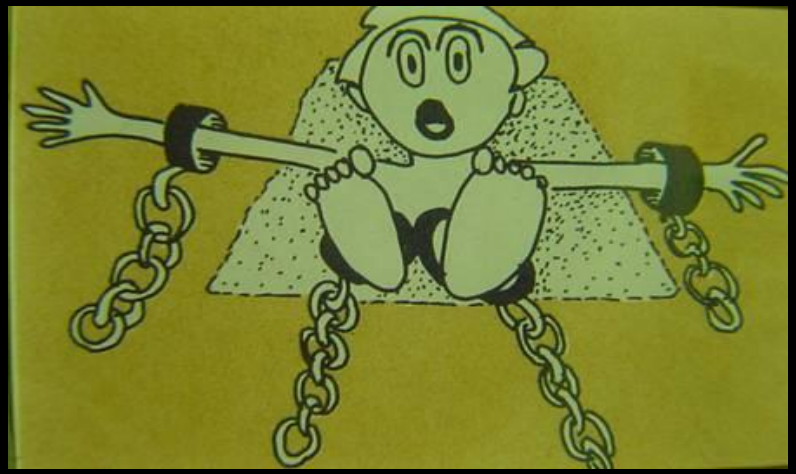
UCBL plastic shoe insert



UCBL plastic shoe insert

Objections to Treatment with Special shoes and Inserts

- Children do not like to wear shoes



Objections to Treatment with Special Shoes and Inserts

- It is difficult to keep a tight exact fit in a rapid growing child.

Problem

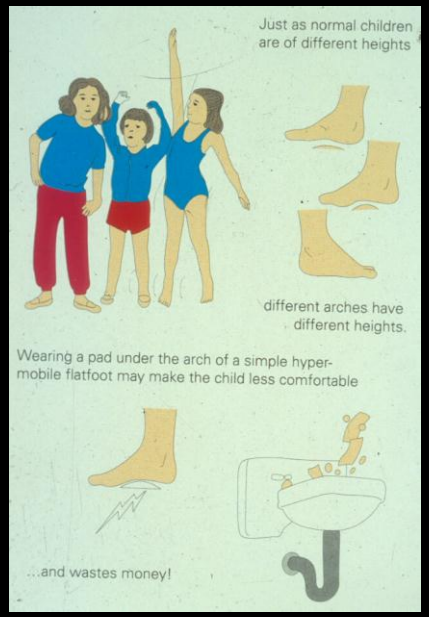
- The foot is theoretically growing in 24 hours a day
- The children is sleeping or resting 12 hours a day.
- Sitting either at home or in school 6 hours a day.

Problem

- In the remaining active hours the child is in the stance phase only for 1-2 hours.

Objection to corrective shoe

- Inferiority complex in body image & self esteems.



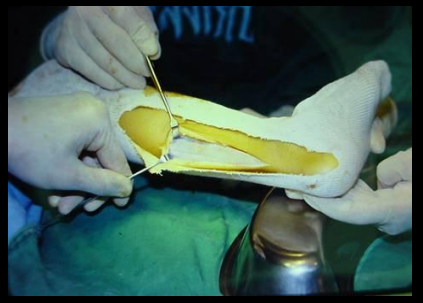
Flat foot management

Surgery

Surgical Option

- Heel cord lengthening
- Calcaneal osteotomy
- Subtalar fusion
- Tripple arthrodesis

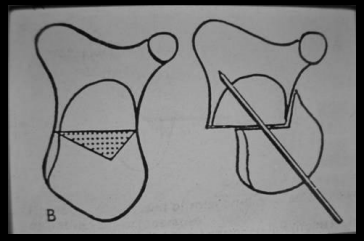
surgery

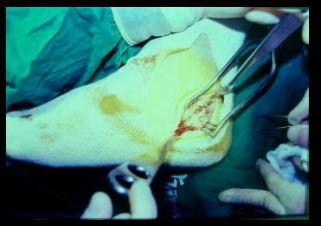


- Heel cord lengthening

surgery

Calcaneal Osteotomy





Surgical correction for flat foot

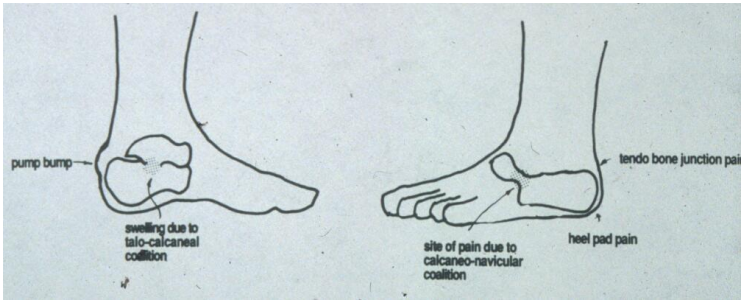
Subtarlar fusion

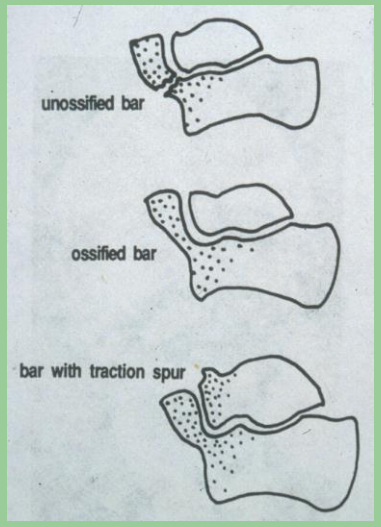
Surgical correction for flat foot

- Tripple Arthrodesis

Rigid flat foot

The Painful Flatfoot



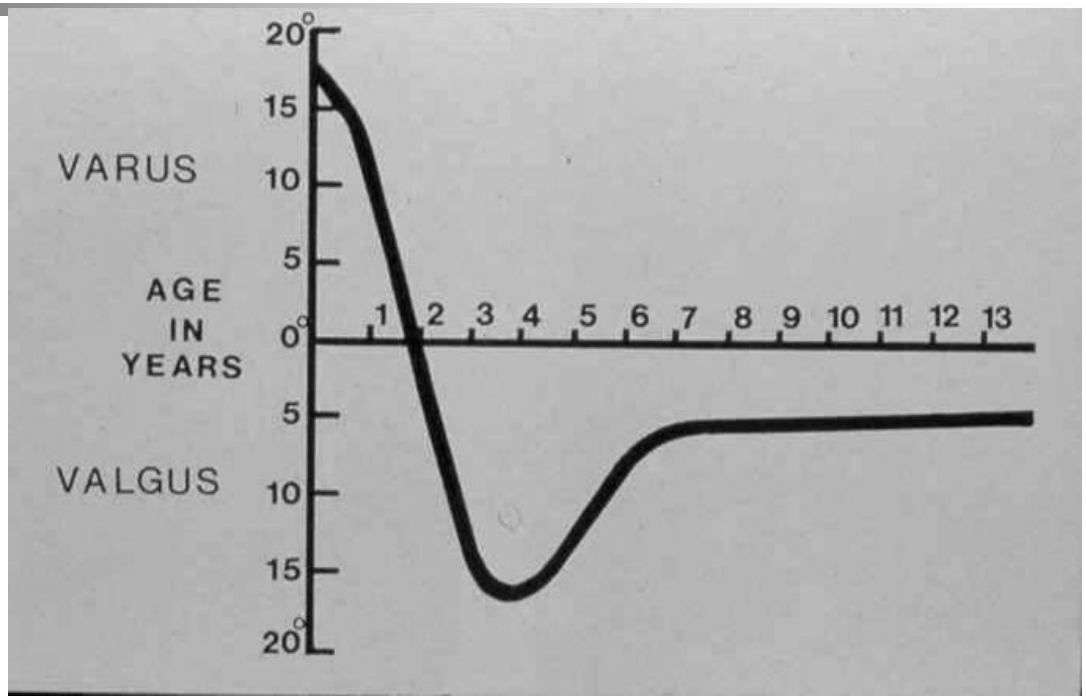


Tarsal Coalition

consult

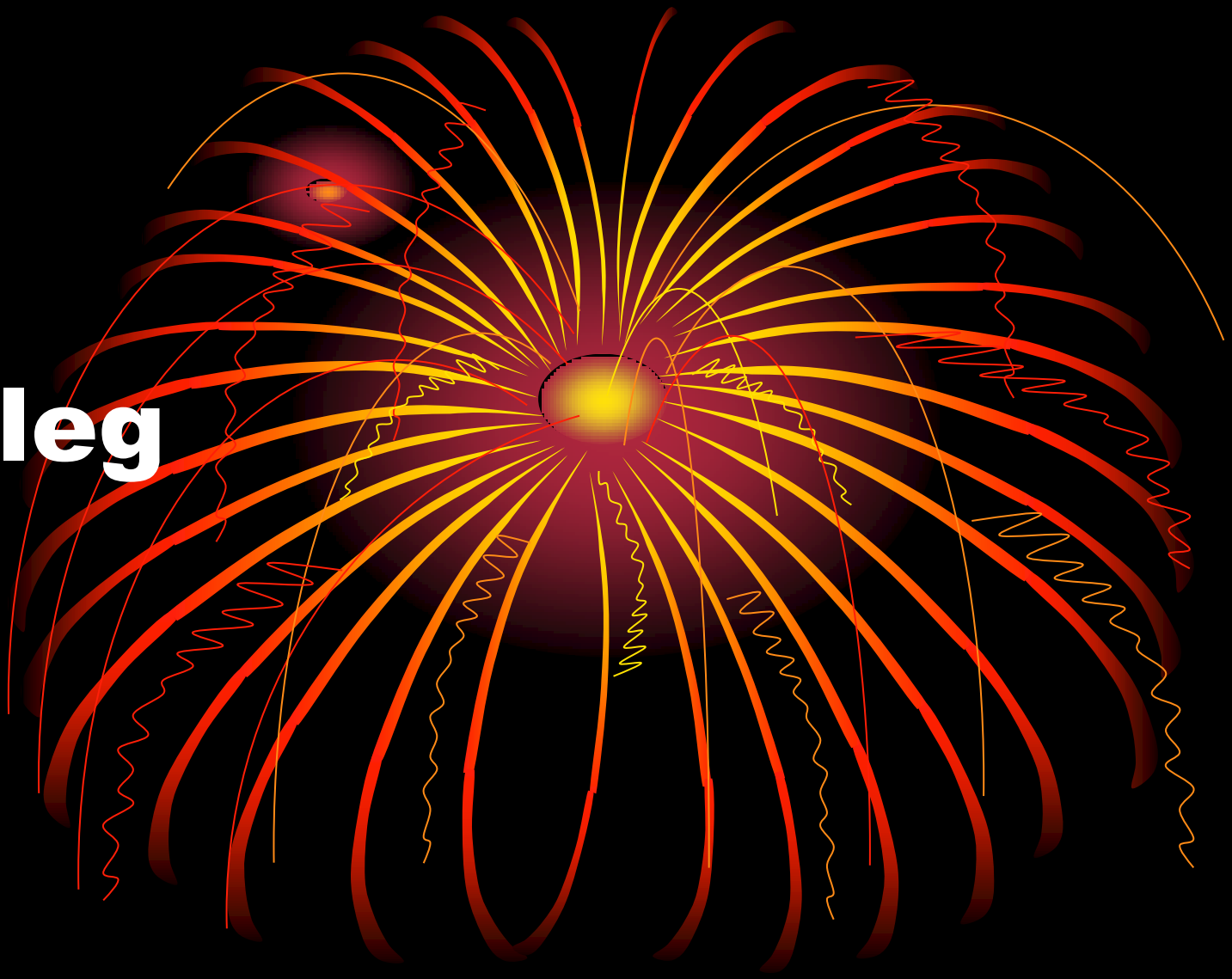
Angular deformity of lower limb

The Normal Evolution of Leg Shape



Bowleg & Knock Knees

Bowleg

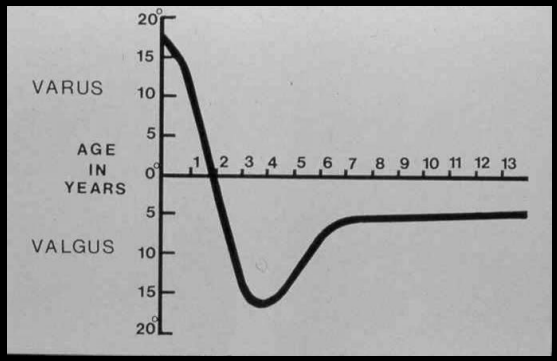


Type of bow leg

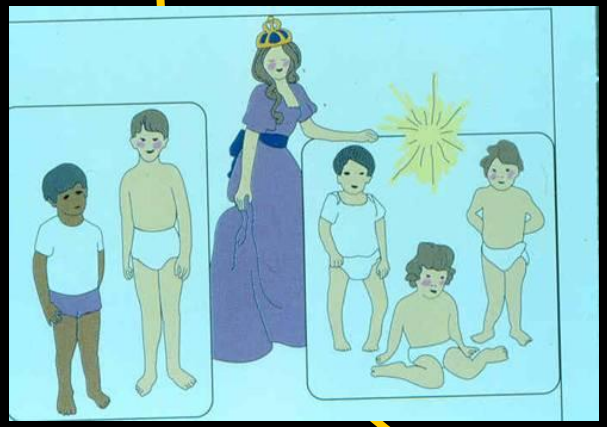
- Apparent tibial torsion
- Distal incurvation of the tibia

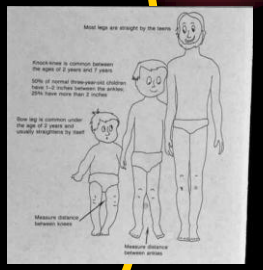
Bow leg

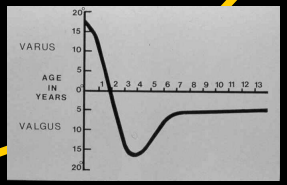
Natural history



Normal evolution of leg shape







Management

of

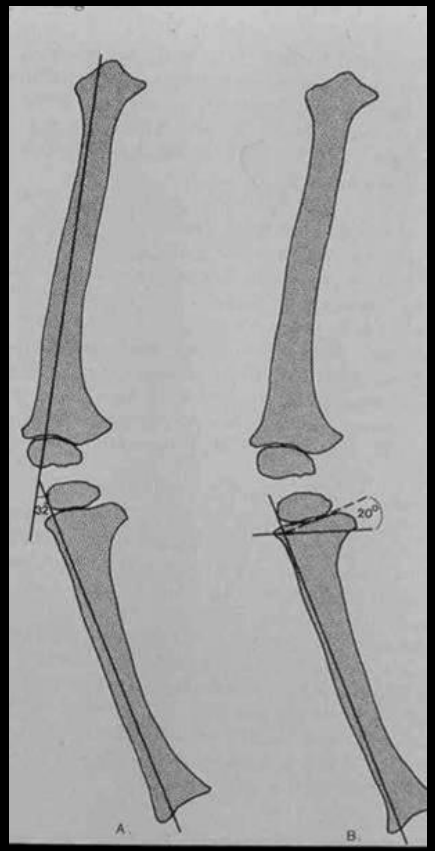
Severe Bow Leg

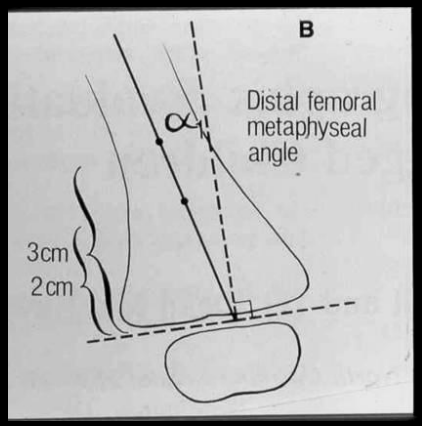
Angle Measurement

- Metaphyseal-

  Diaphyseal Angle

- Drennan's Angle





Severe bow leg

- Femoral metaphyseal-diaphyseal angle / tibial metaphyseal-diaphyseal angle < 1
- It means that the angular deformity is at proximal tibia.

Indication for Treatment

- Children age > 2 yr
- FT Angular deformity > 11^{o}

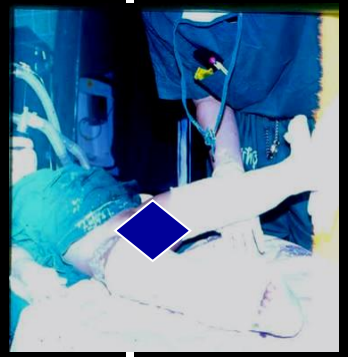
Severe bow leg

Management

1. Bracing
2. Casting
3. Surgery
4. DB.Splint

management

casting



casting

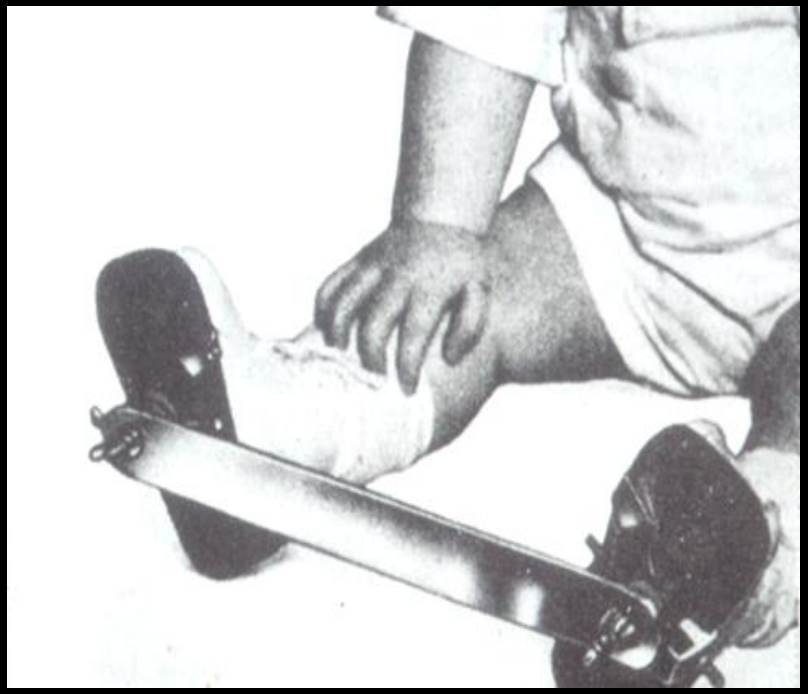
casting

Post casting

Post casting

Bow legs

- DB.Splint



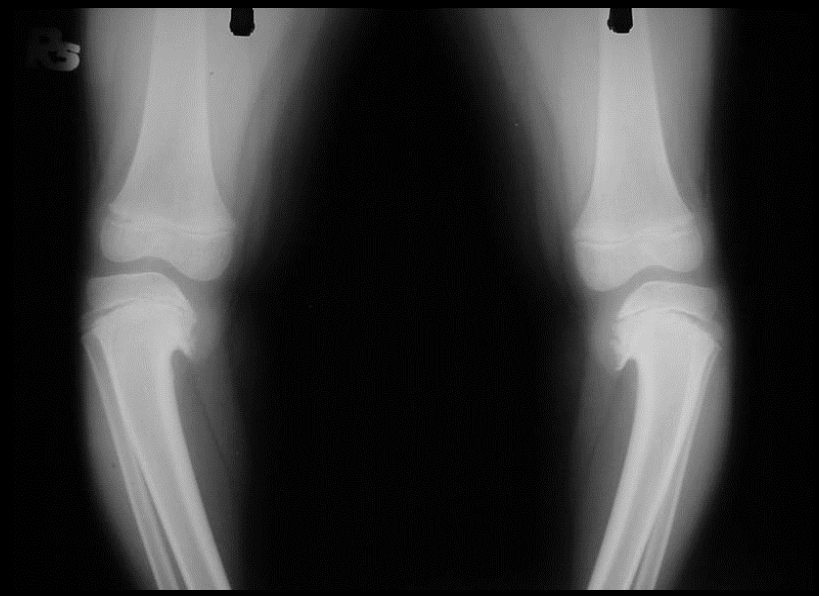
Severe bow leg

surgery

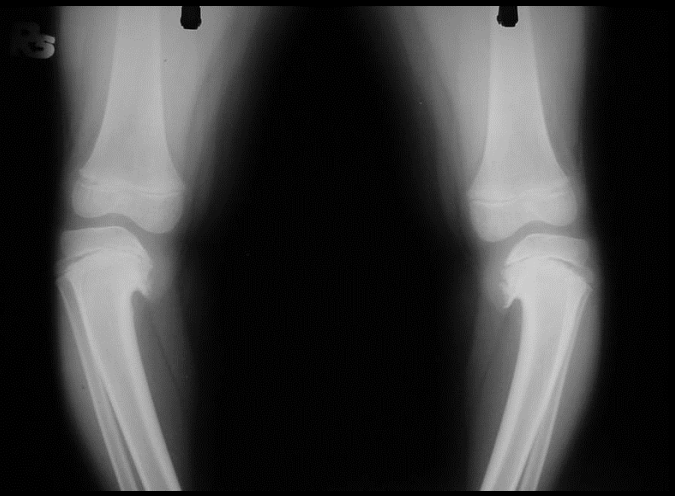
Complication of casting

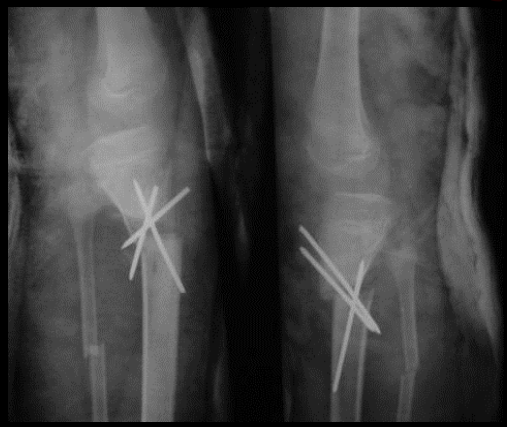
Severe varus

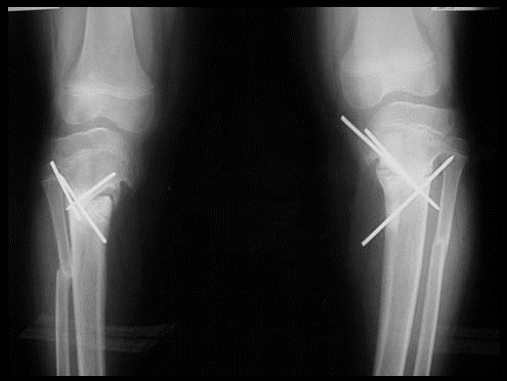
- **Blount，s disease**



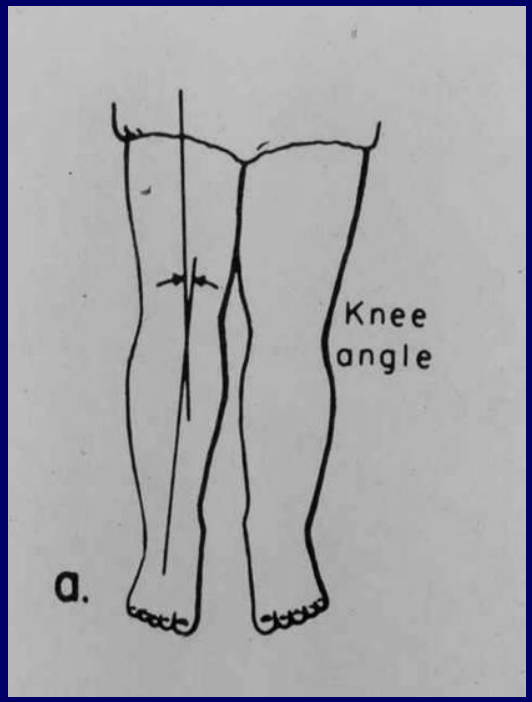
Blount's disease







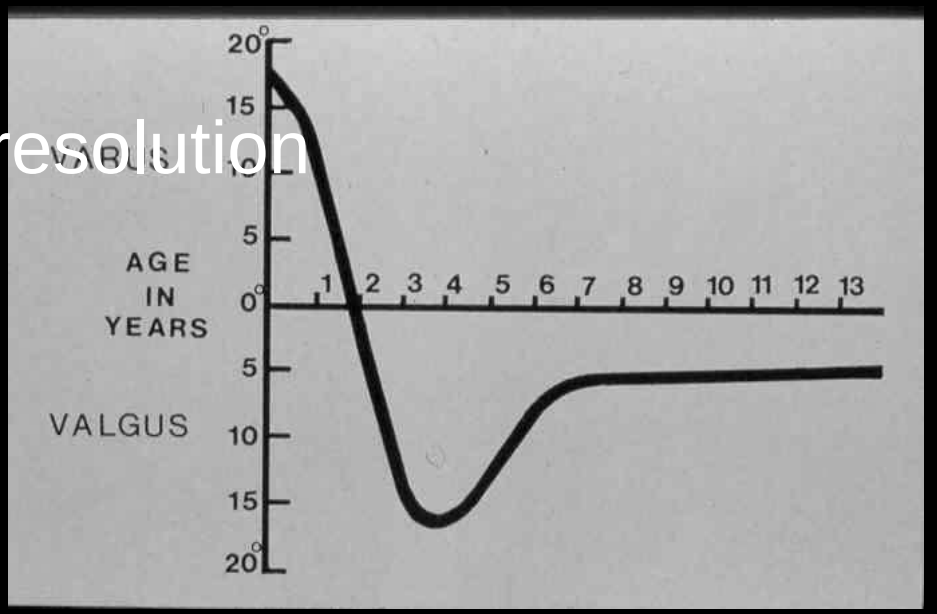
Knock knees



Knock knees

Natural history

- Spontaneous resolution



Asymmetrical genu valga

management

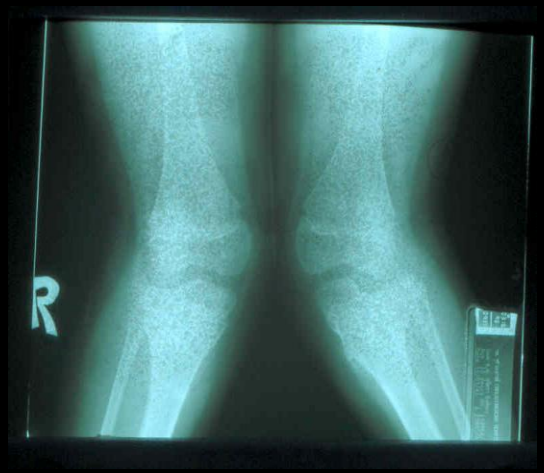
⇩

consult

Asymmetrical genu valga

Severe genu valgus

Surgery for severe genu valga




Thank you