

# **Congenital Talipes Equinovarus Deformity**



# Incidence

- each live births 1000 in 1 Incidence
- If a couple have a first child with idiopathic CTEV, the incidence of a second sibling is .200 in 1
- .50% Bilaterality in about

Dating since birth

1. Congenital

th cent.. Modern Latin, from Latin *talus* 'ankle' + *pes* 'foot'

2. Talipes

Talipes.2

3. Equinus.3

Plantarflexion at Ankle

4. Varus.4

Heel inversion + Forefoot adduction and supination

5. Deformity

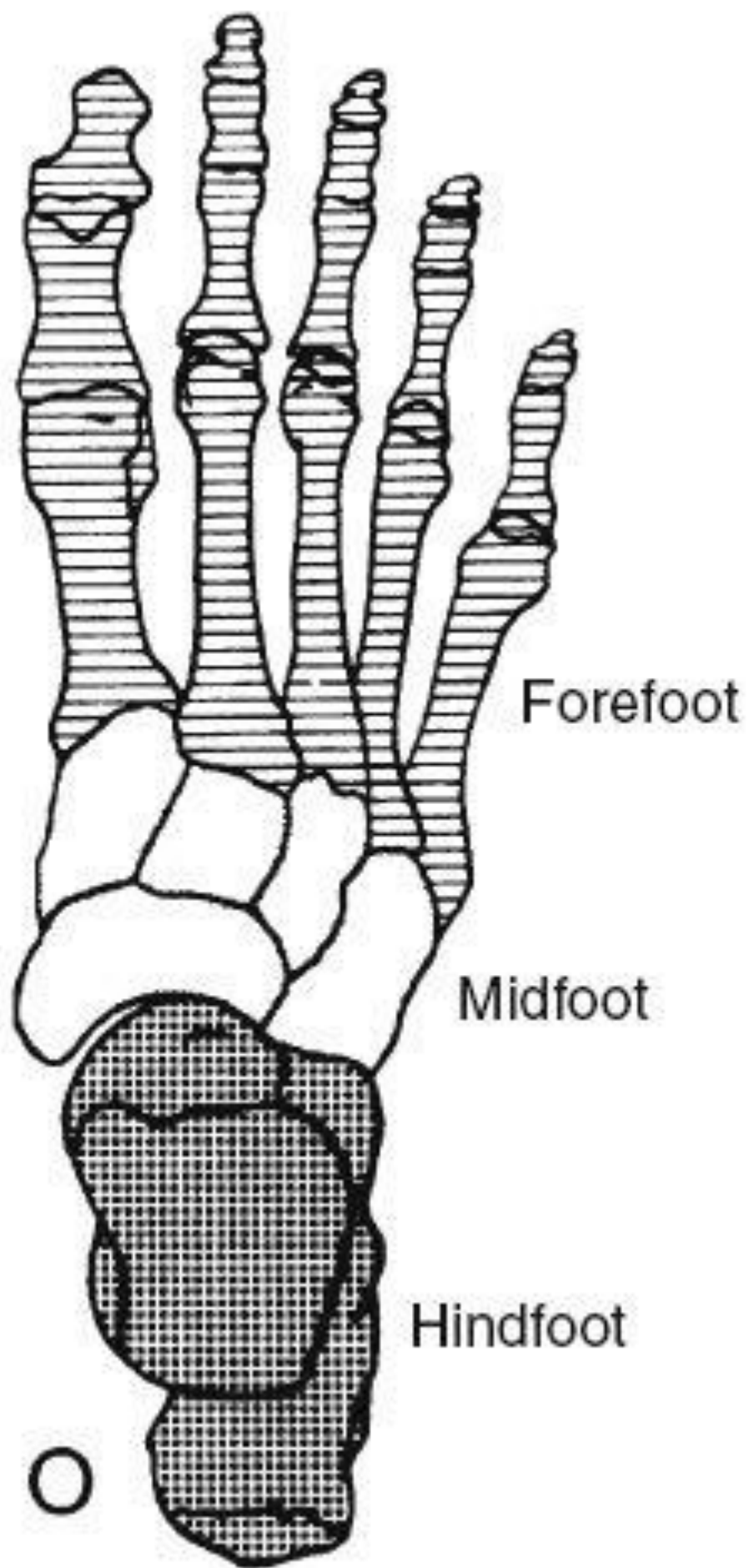
Deformity.5

Misshapen - Fixed abnormal position

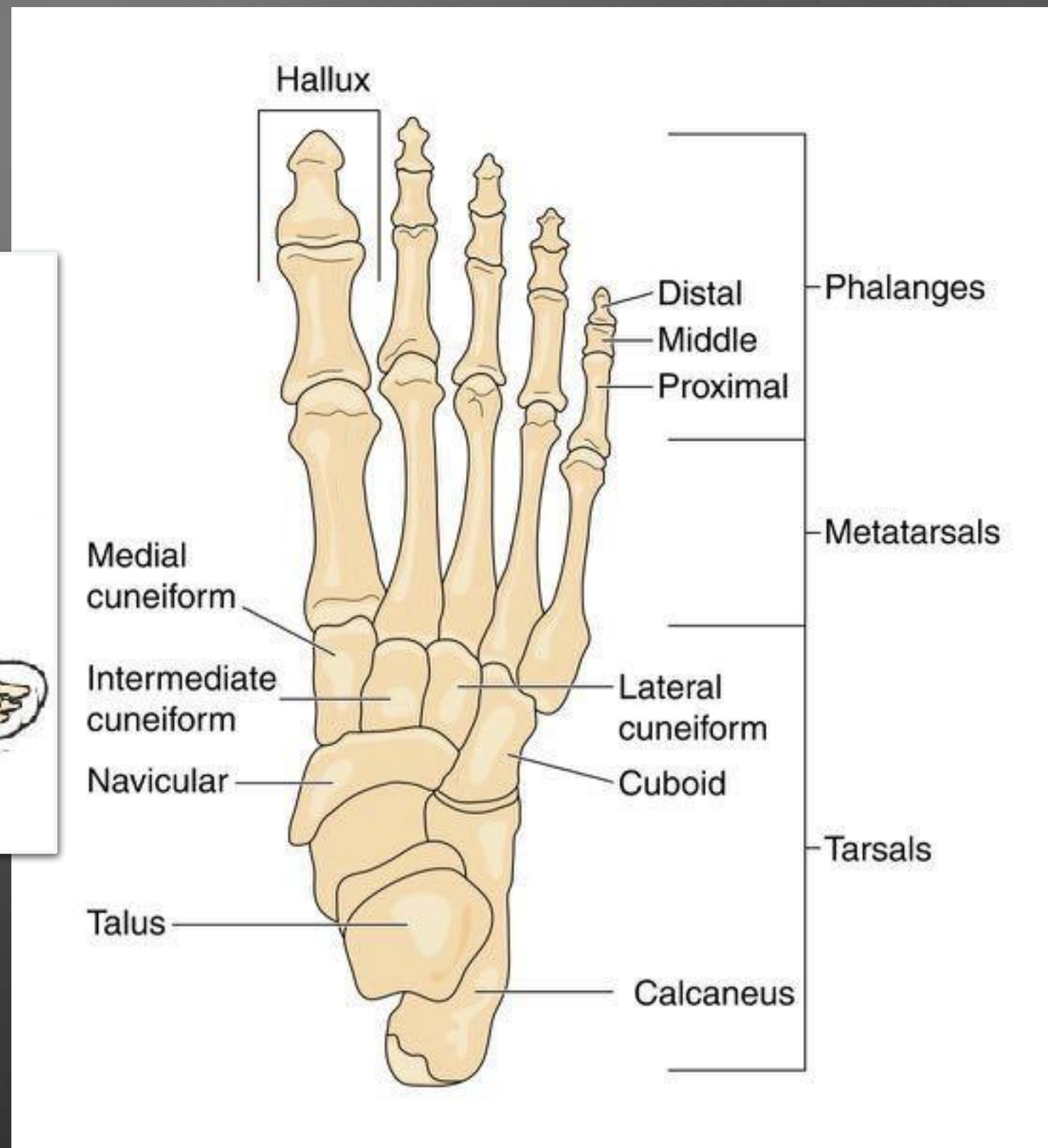
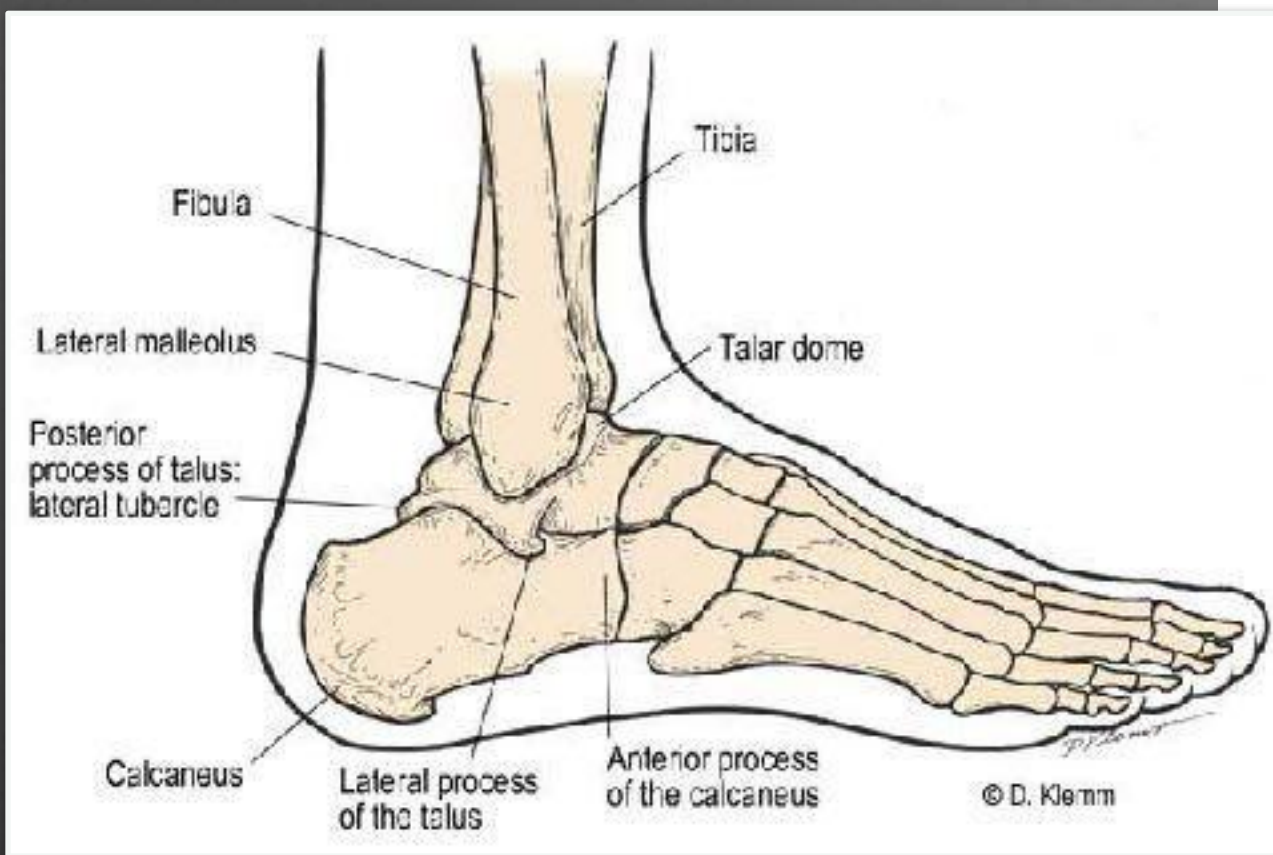


# CTEV or Clubfoot









Equinus at the level of the ankle joint .١

2. Inversion at the heel .٢

3. Forefoot adduction and supination .٣

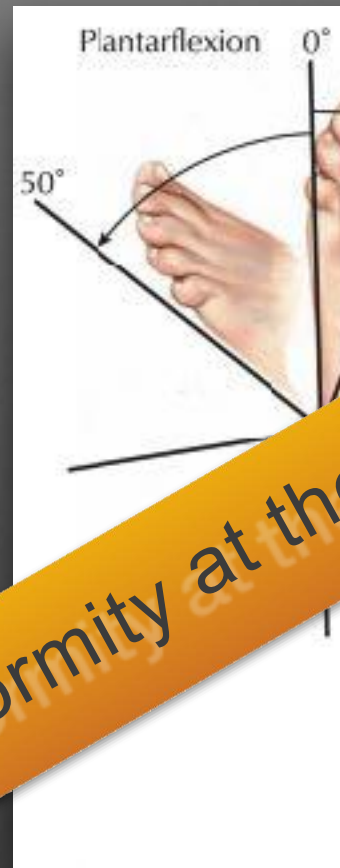
4. Cavus Cavus .٤

5. Int tibial torsion Int tibial torsion .٥



# Ankle Joint

- Dorsiflexion / Plantar flexion
- Fixed plantar flexion deformity ... Equinus
- Fixed Dorsiflexion deformity ... Calcaneus

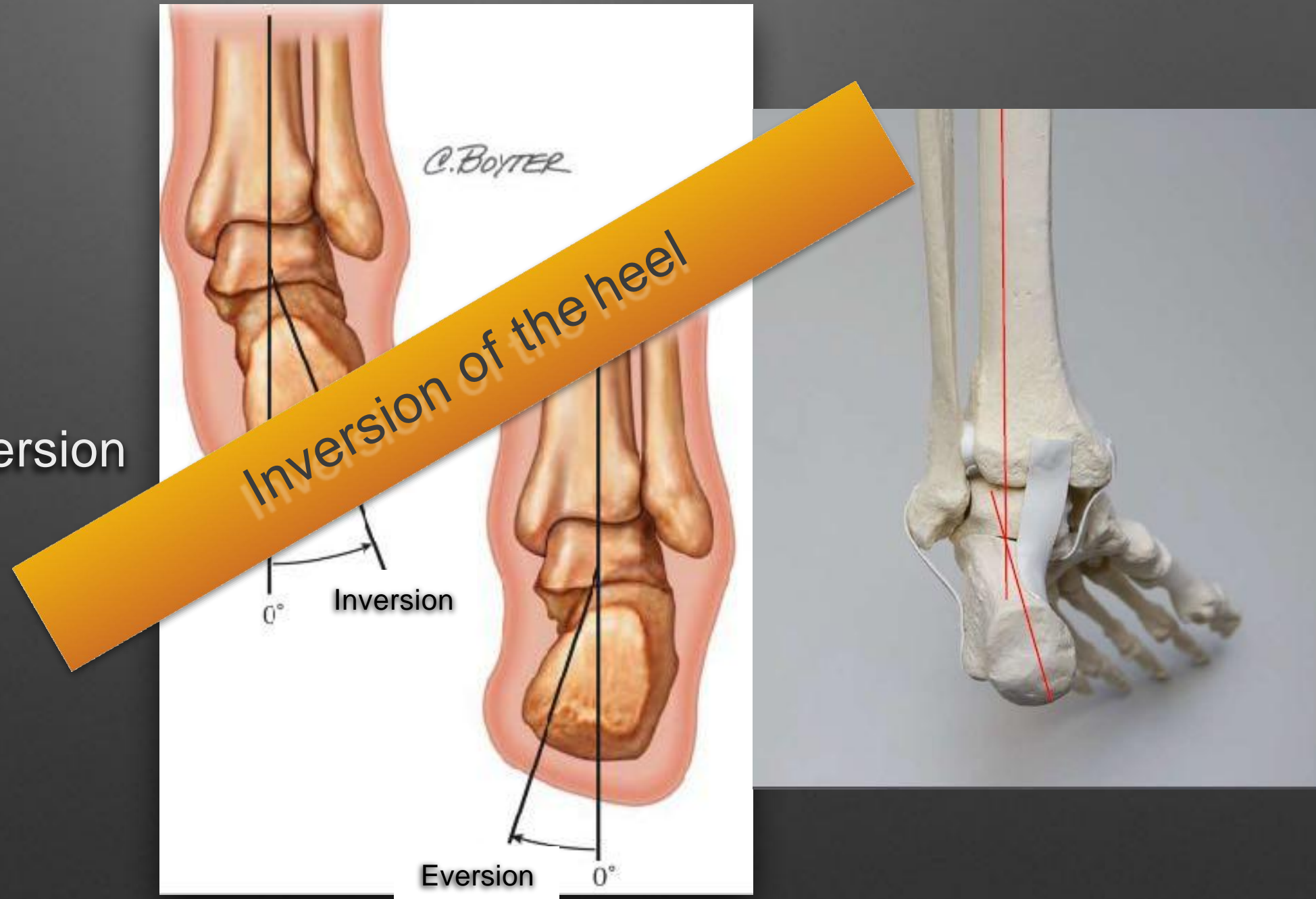


Equinus deformity at the ankle joint



# Subtalar joint

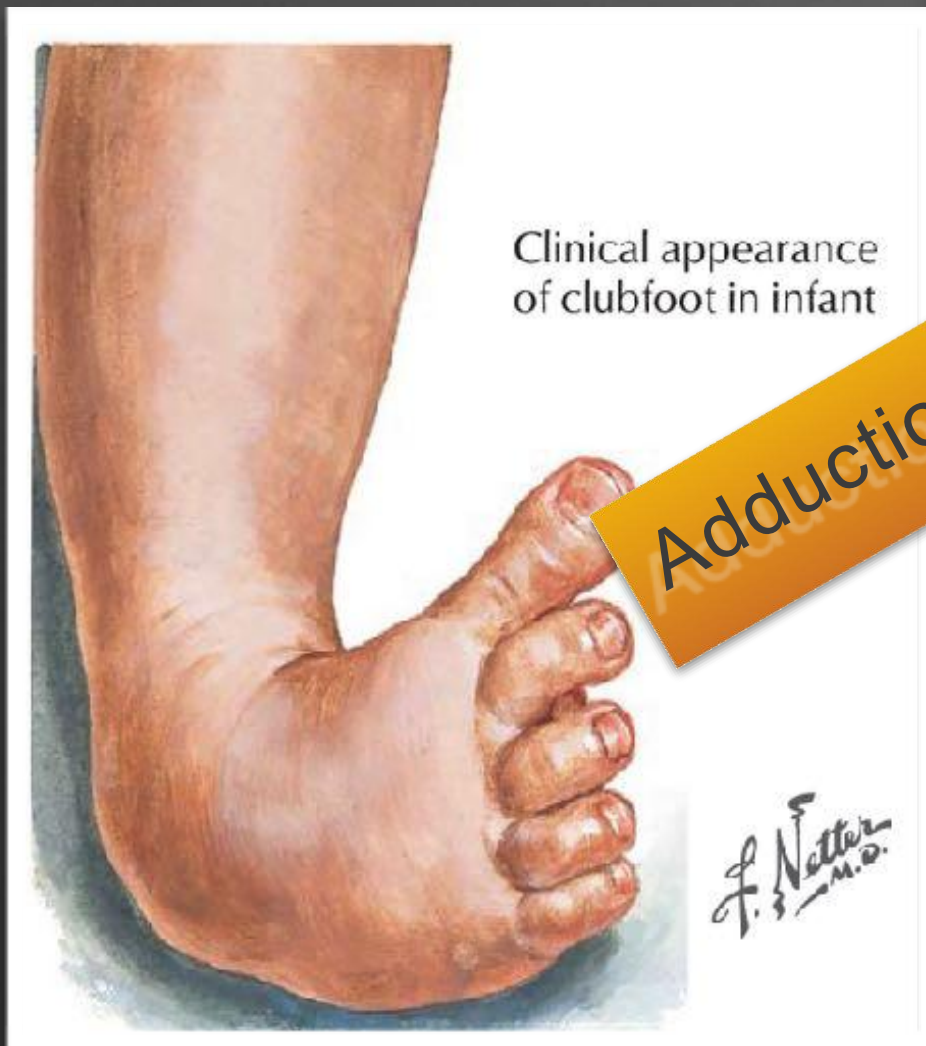
- Inversion / Eversion





# Midtarsal joint

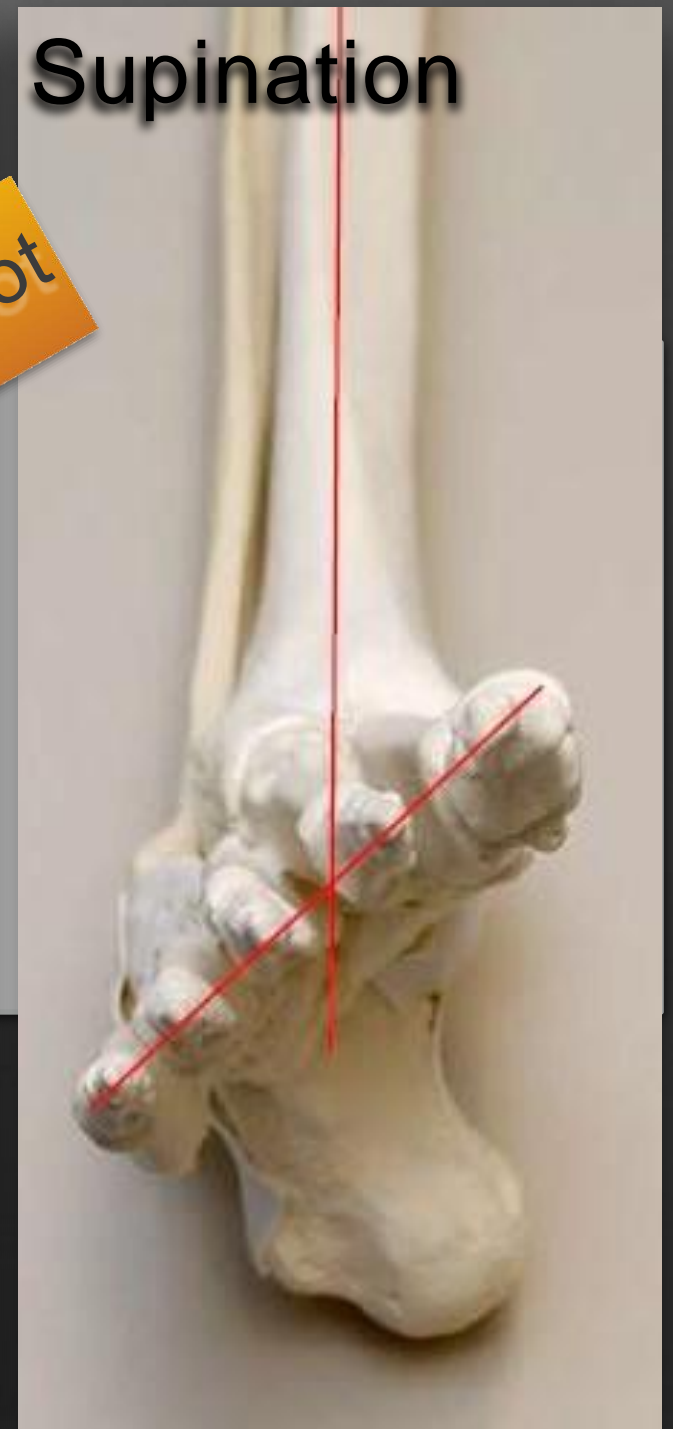
- Adduction / Abduction
- Supination / Pronation



Adduction

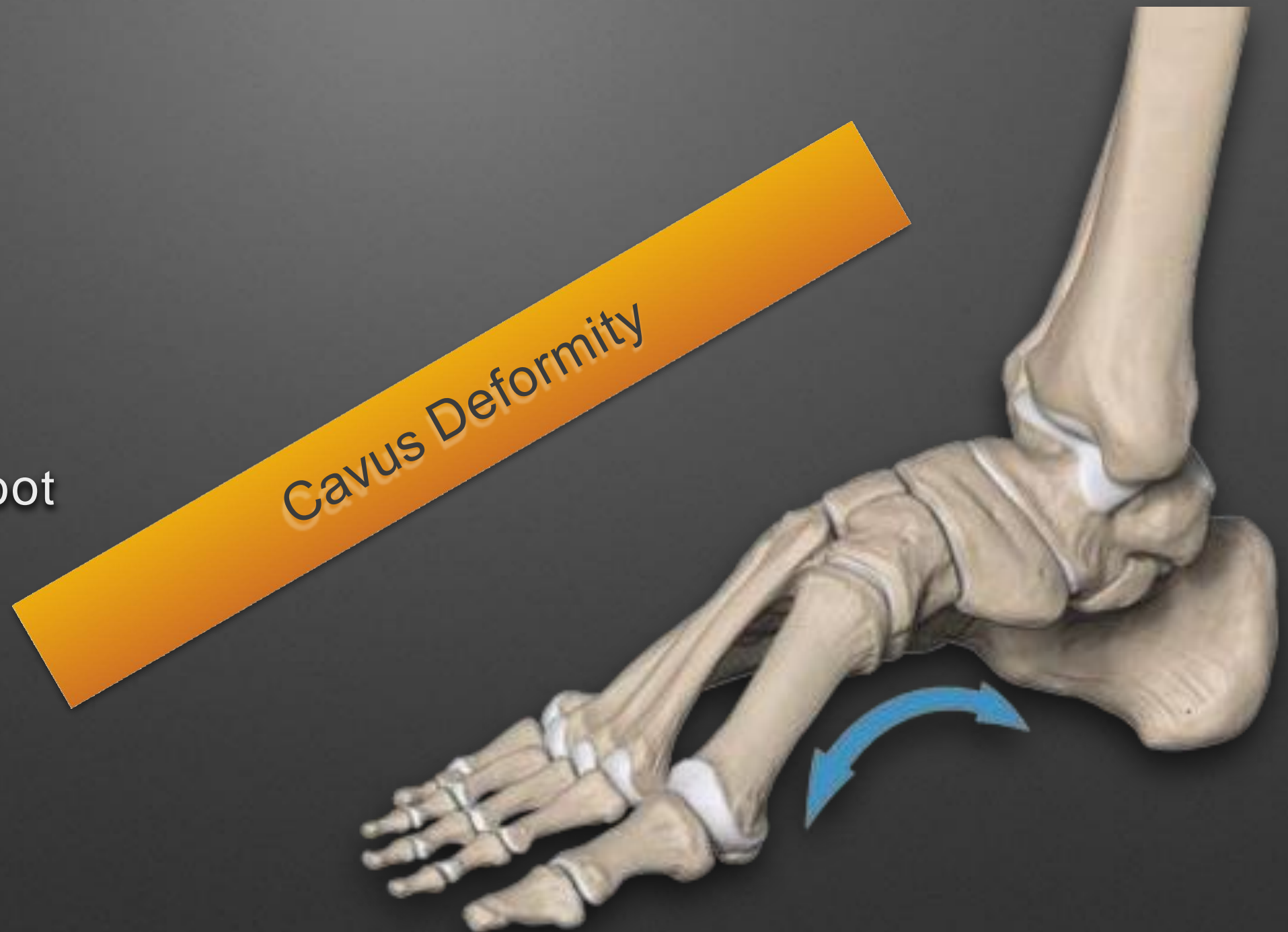


Supination



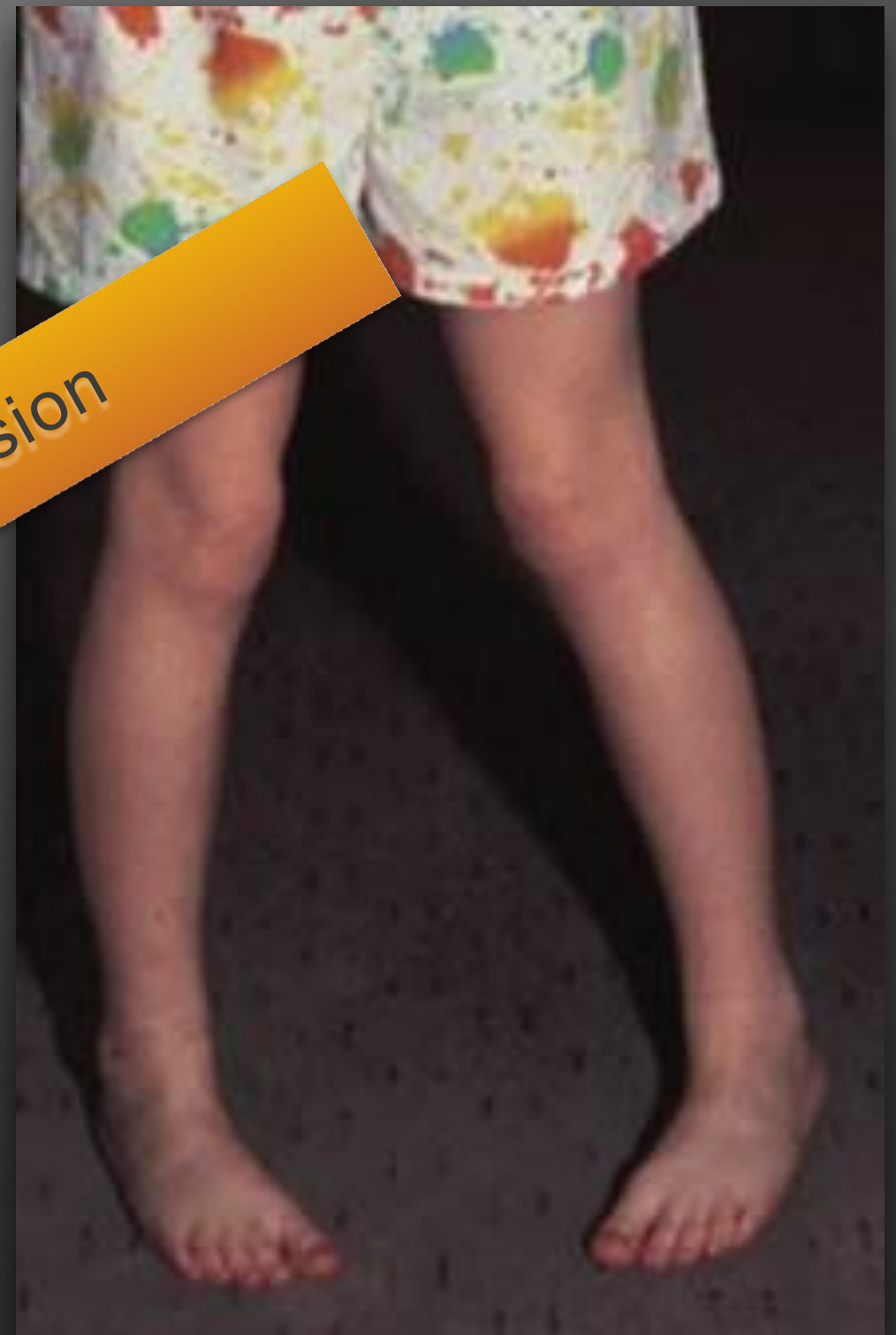
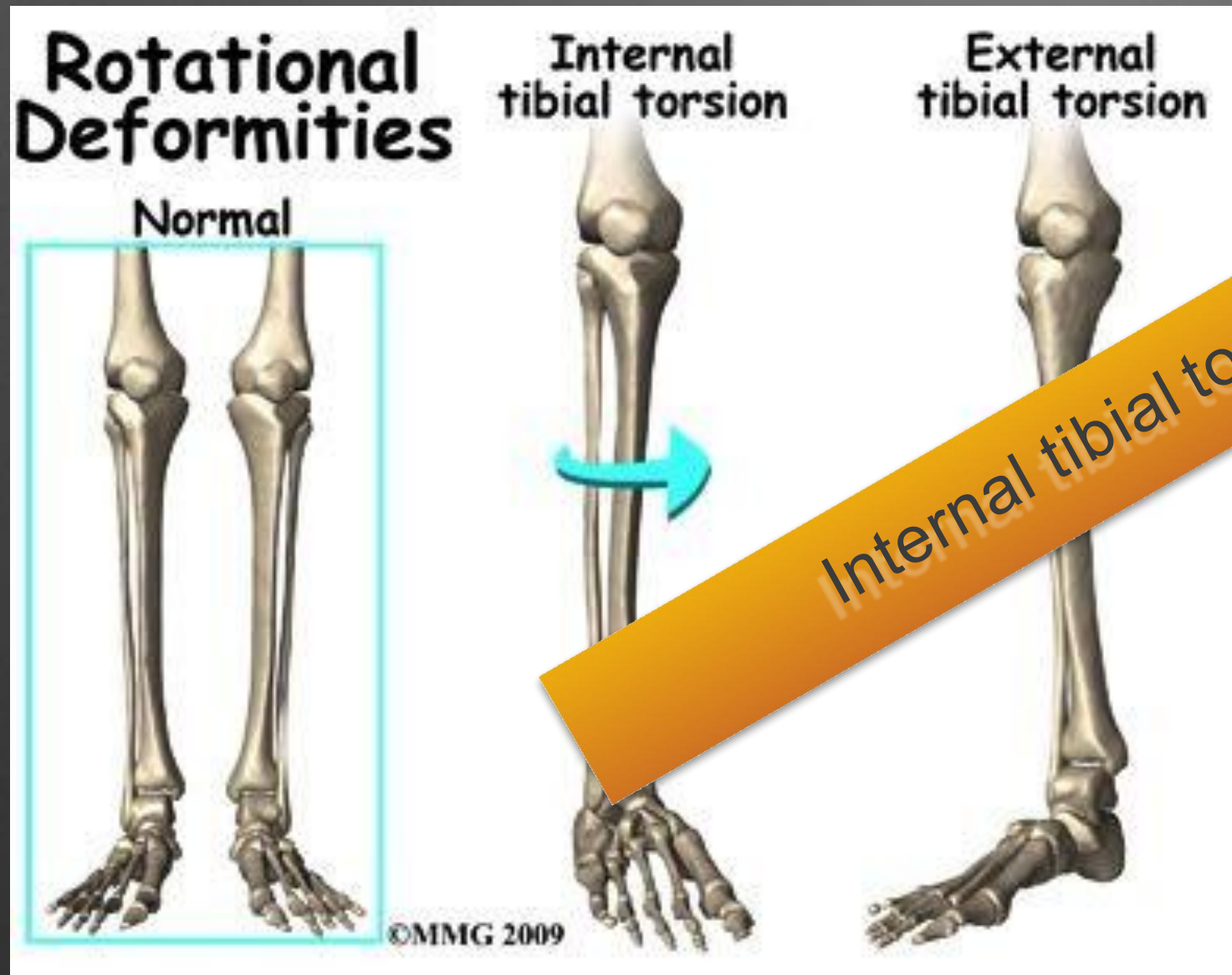
# Pes Cavus

- High arched foot





# Internal tibial torsion



# Etiology of Clubfoot



# CTEV / Clubfoot

- Idiopathic
- Neuromuscular
- Syndromic/dysmorphic
  - Arthrogryposis, diastrophic dysplasia, Möbius or Freeman-Sheldon syndrome



No cause

- Idiopathic

Arthrogryposis Multiplex Congenita

- Myopathic

Spinal dysraphism (Spina Bifida),  
Cerebral palsy

- Neuropathic

- Osteopathic

Tibial Hemimelia



# Etiology of Idiopathic CTEV

## 1. Extrinsic theory

- Oligohydramnios

Extrinsic theory .1)

Oligohydramnios •

## 2. Intrinsic theory

Intrinsic theory .2)

a. Genetic factors ?? Genetic factors have been implicated .a

b. Arrest in embryonic development .b

c. Retractive fibrotic response ... increase in collagen fibers and fibroblastic cells in the ligaments and tendons of a clubfoot .c

d. Localized neuromyogenic imbalance, especially involving the peroneals .d

e. Primary germ plasm defect in the cartilaginous talar anlage .e  
. produces the dysmorphic neck and navicular subluxation.

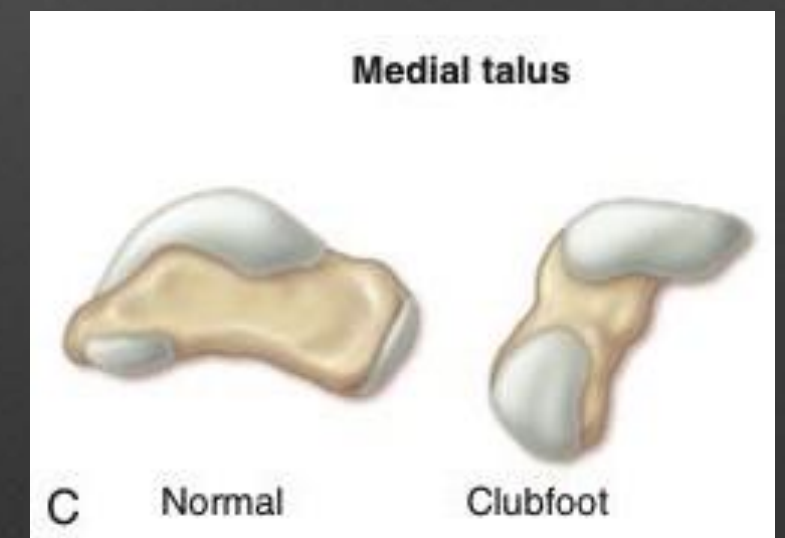
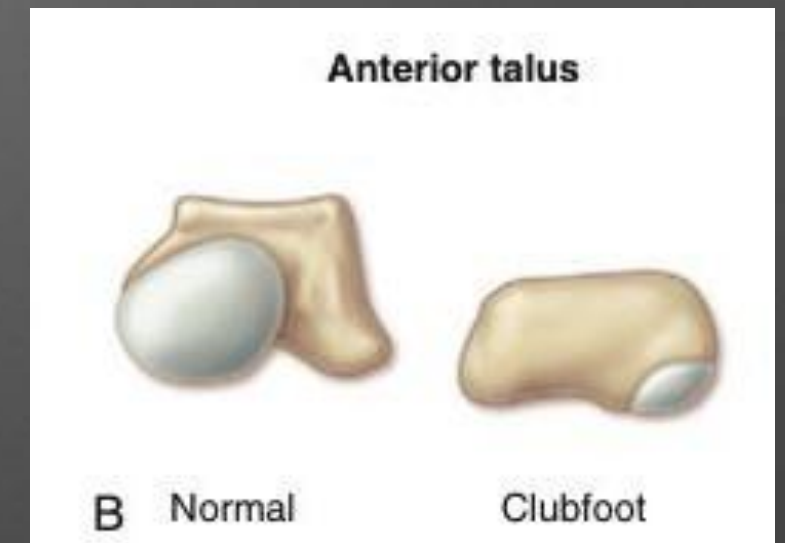
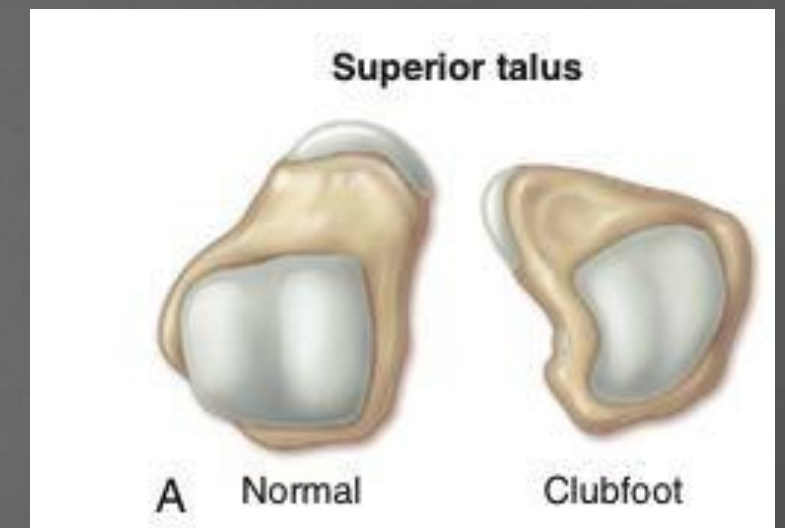


## Germ Plasm Defect

The neck is shortened and deviated medially

The medial and plantar deviation of the navicular articulation is apparent

Equinus of the neck in relation to the tibiotalar articular surface is significant





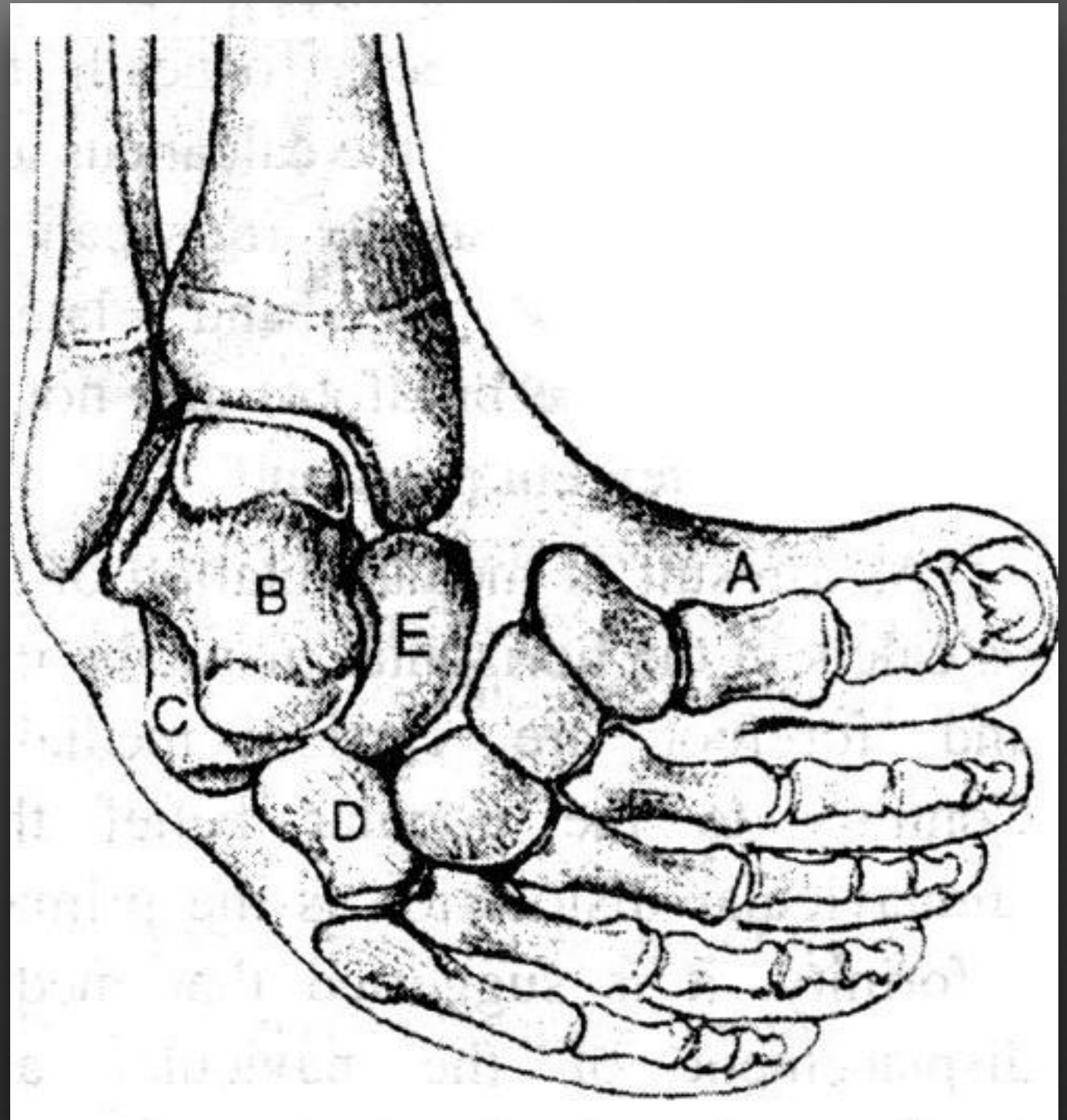
# Pathologic anatomy - Bony

- *The deformity of the talus is the main pathologic source of clubfoot deformity*

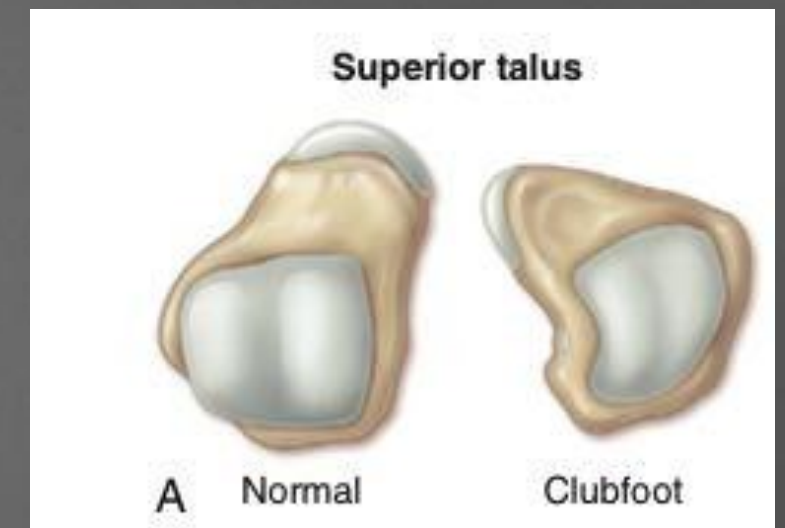
• The talar neck is short and deviated medially and plantarward. The body of the talus appears externally rotated within the ankle mortise

- The navicular is consistently displaced medially and plantarward on the talar head
- Calcaneus in equinus and medial rotation
- The cuboid is similarly displaced medially on the anterior end of the calcaneus
- excessive medial or internal tibial torsion

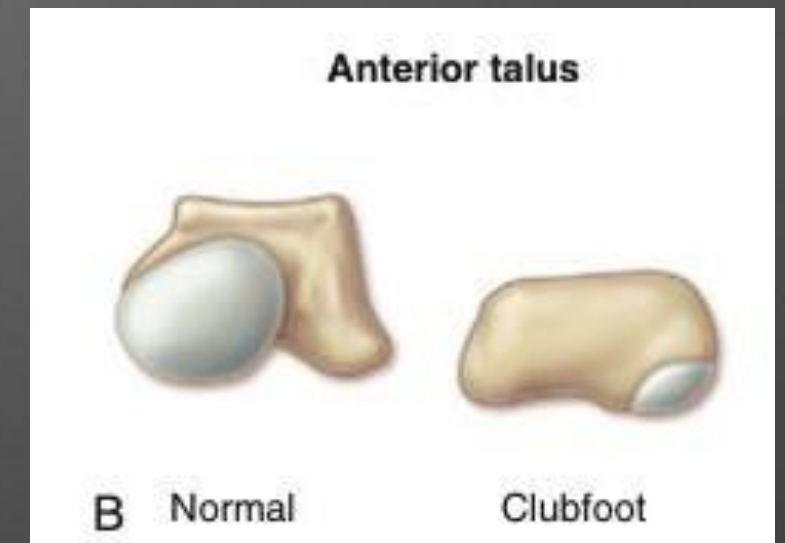
???



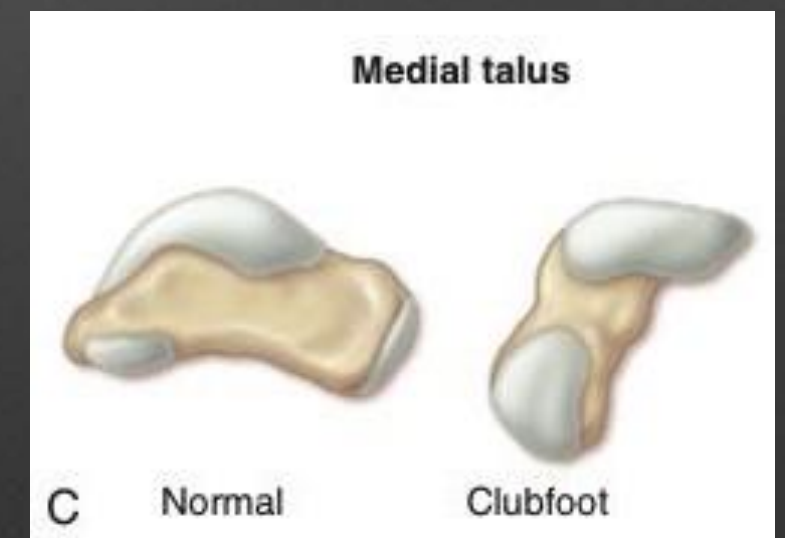
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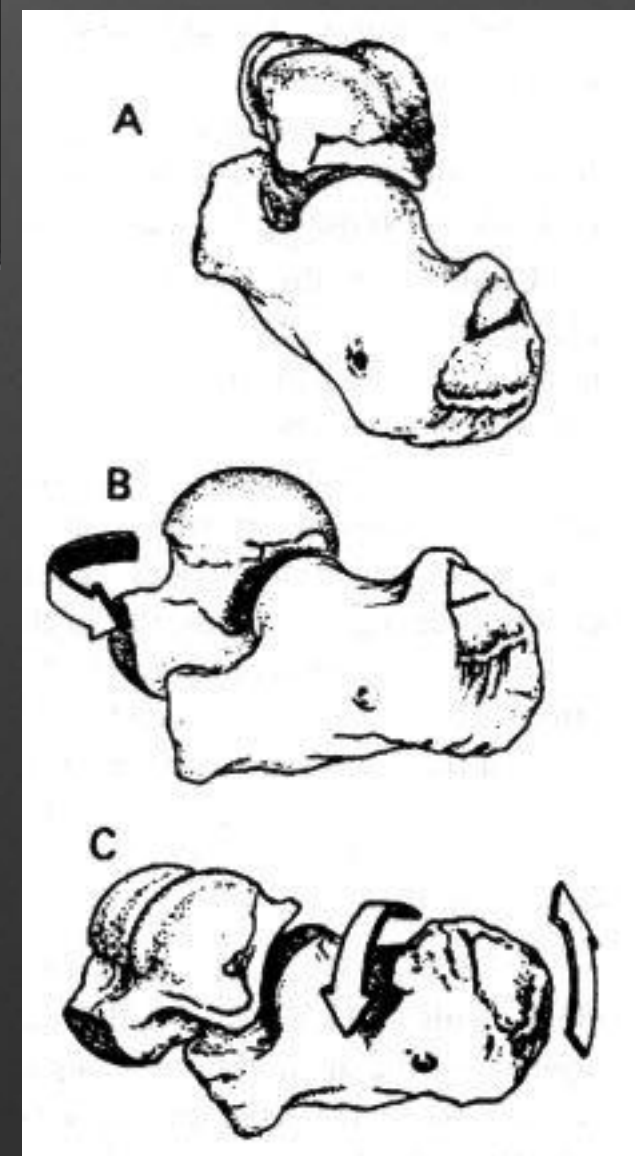
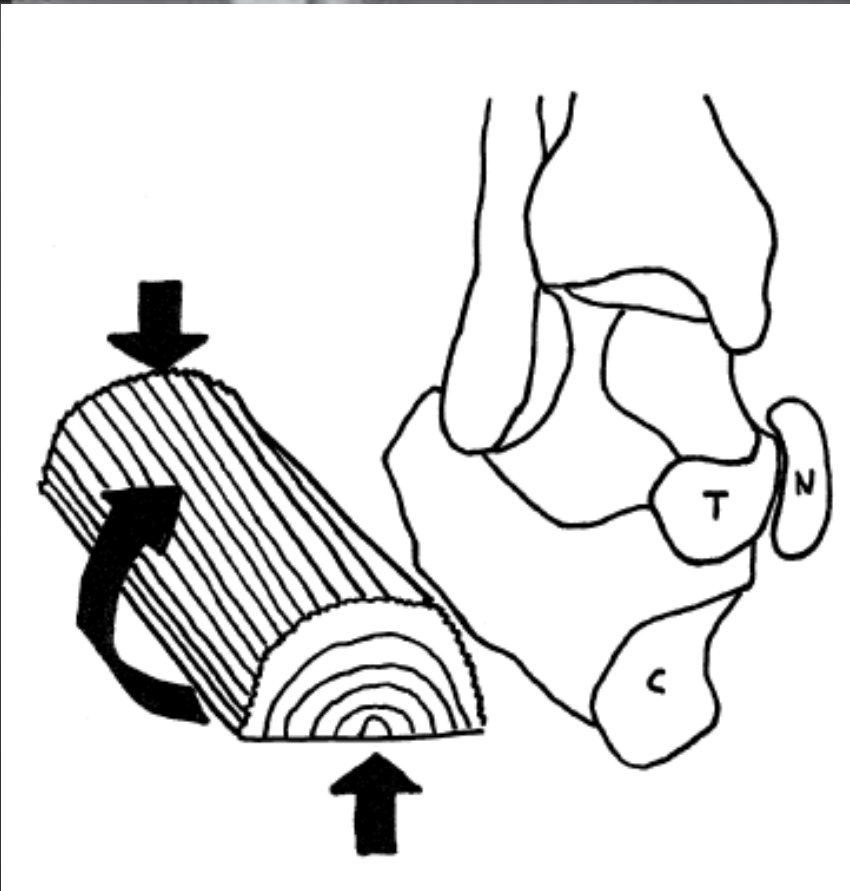
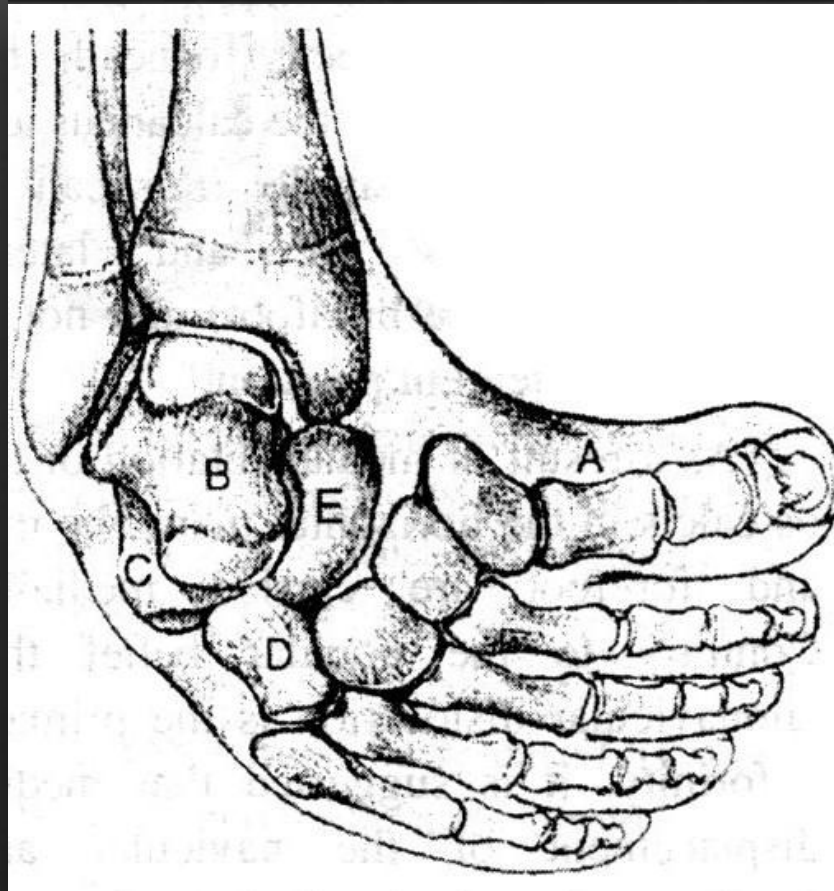
The medial and plantar deviation of the navicular . articulation is apparent



Equinus of the neck in relation to the tibiotalar articular surface is significant



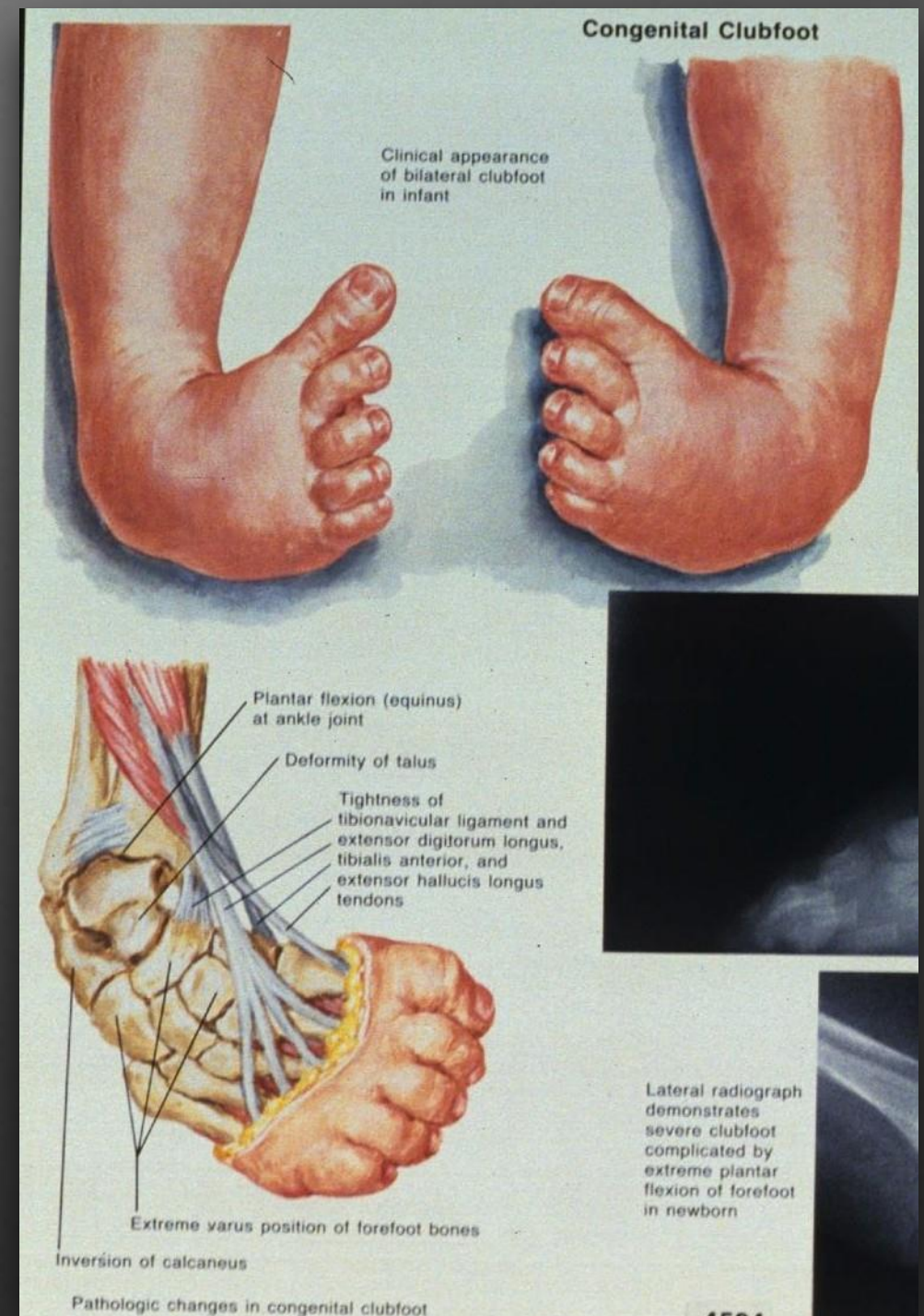






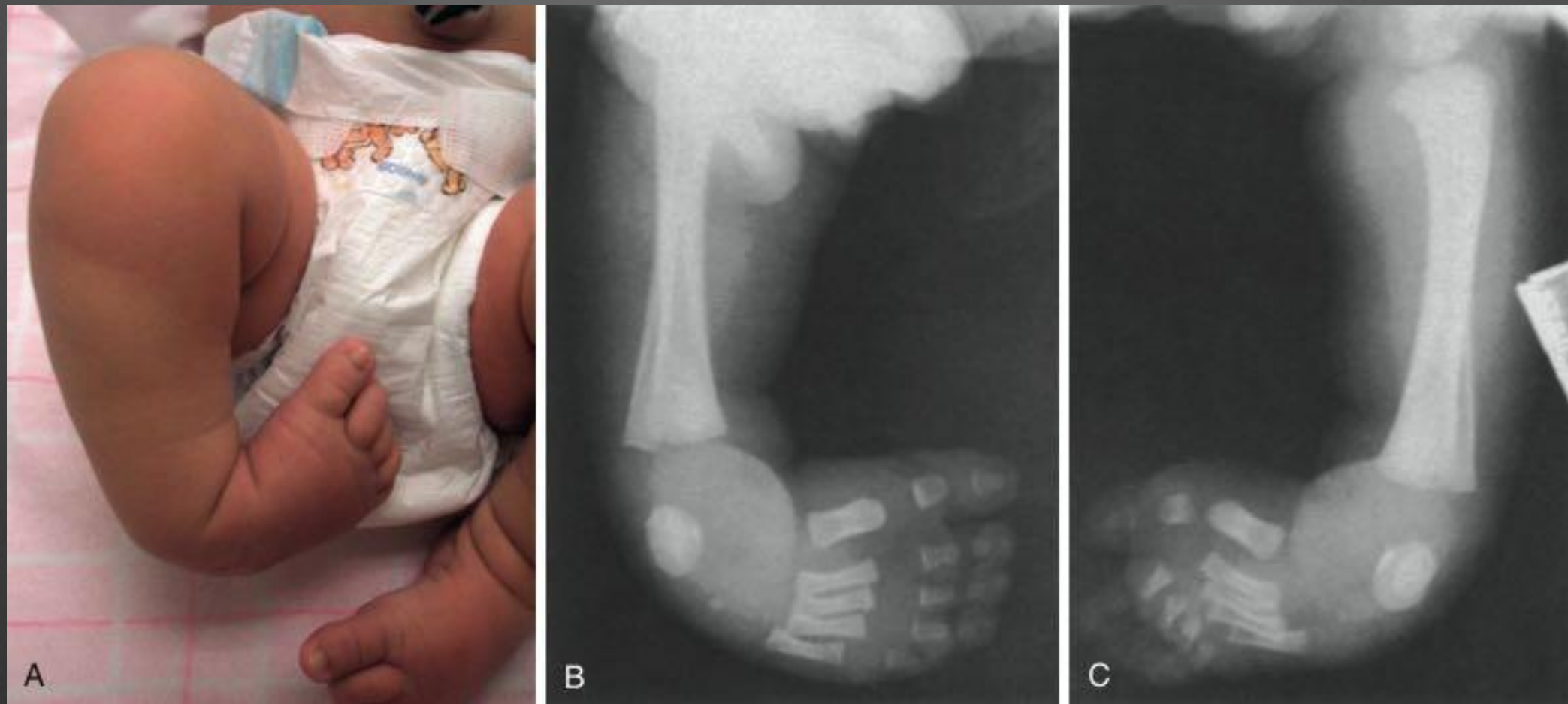
# Pathologic anatomy - Soft tissue

- Fibrosis and contractures of tissues such as the plantar fascia, the calcaneonavicular ("spring") ligament, the tibionavicular ligament, and the so-called master knot of Henry
- Shortened musculotendinous units ... Tibialis post, Triceps Surae, long toe flexors



# Diagnostic Features

- True clubfoot vs postural clubfoot



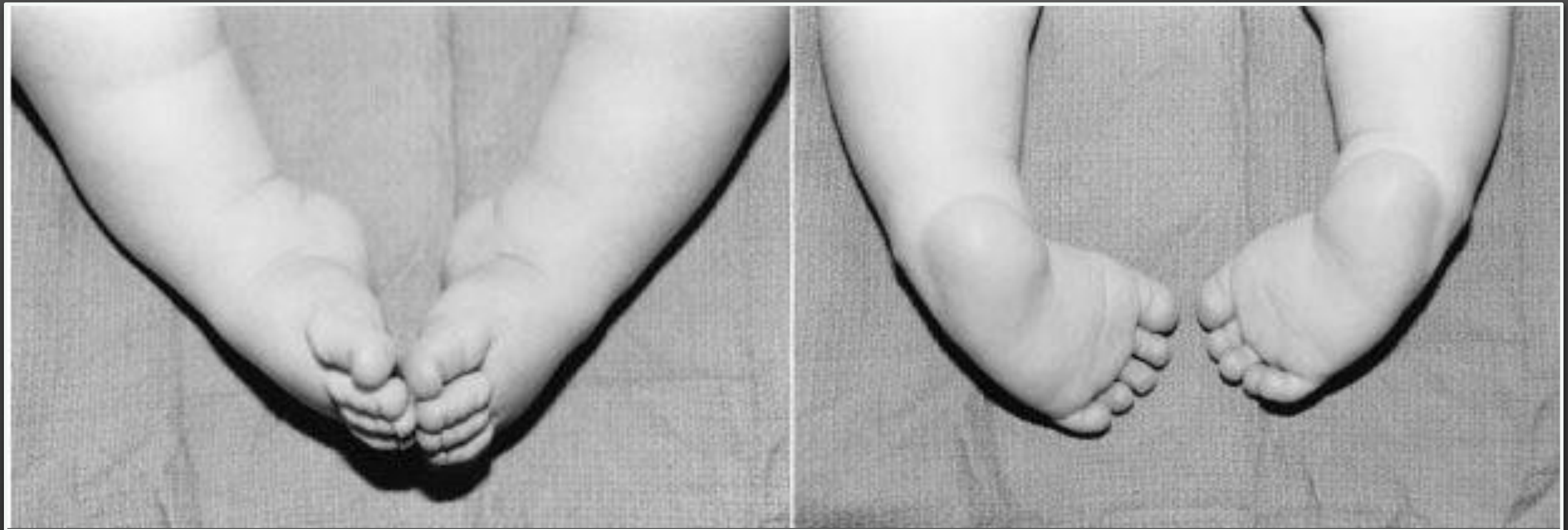
Talipes equinovarus in a newborn. A, Clinical appearance of an untreated clubfoot. B and C, Initial radiographic appearance of bilateral untreated clubfeet

# Physical examination

- General examination
  - Other congenital anomalies ... cleft palate, cardiac anomalies, congenital dislocation hip
- Other etiologies for talipes equinovarus
  - Neuromuscular      Neuromuscular •
  - Syndromes      Syndromes •



# Local physical examination for idiopathic CTEV



Lateral side

Equinus



Equinus: 3 points



Equinus: 2 points

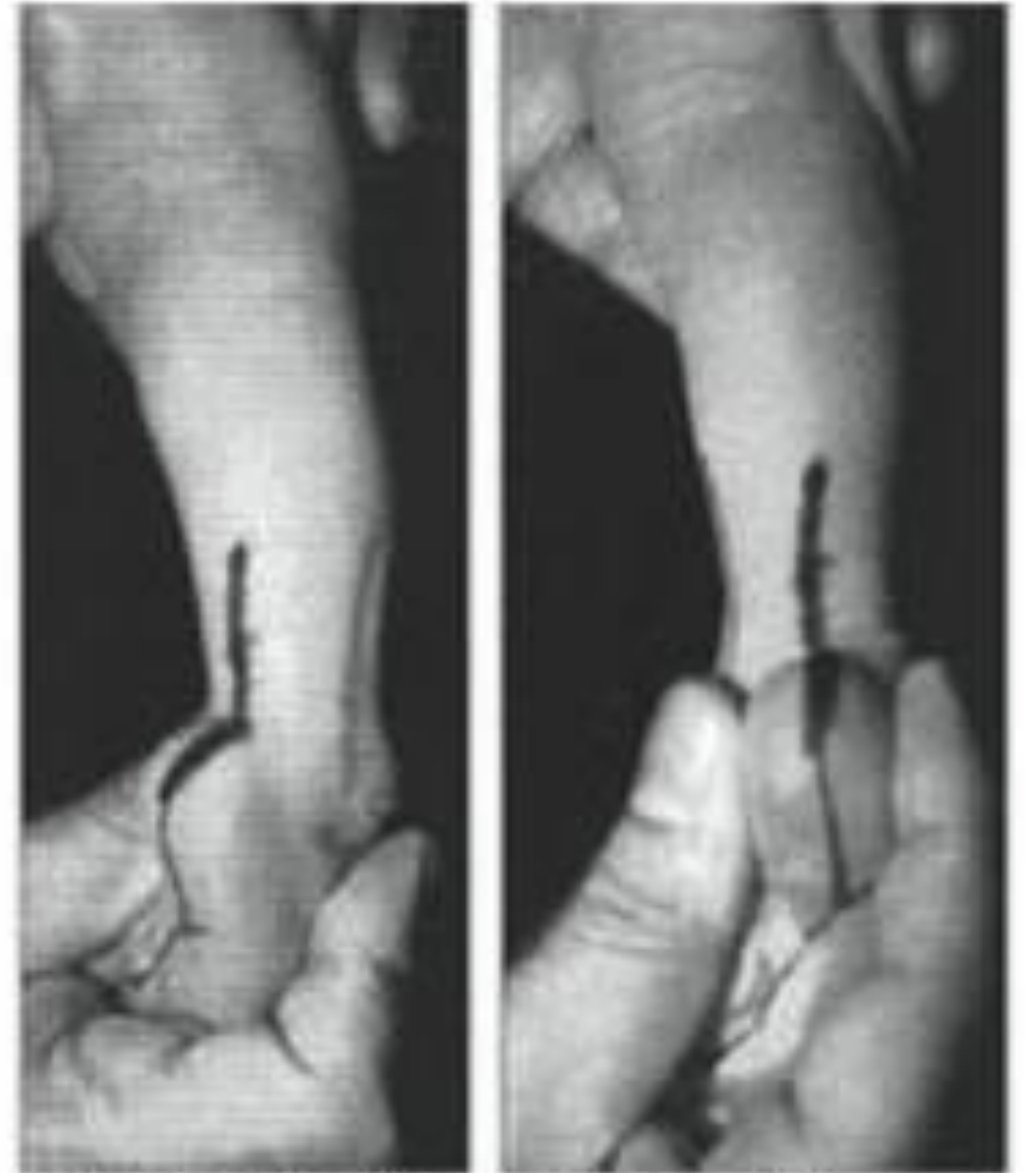


Posterior crease: 1 point

Posterior aspect

Heel varus

Post crease

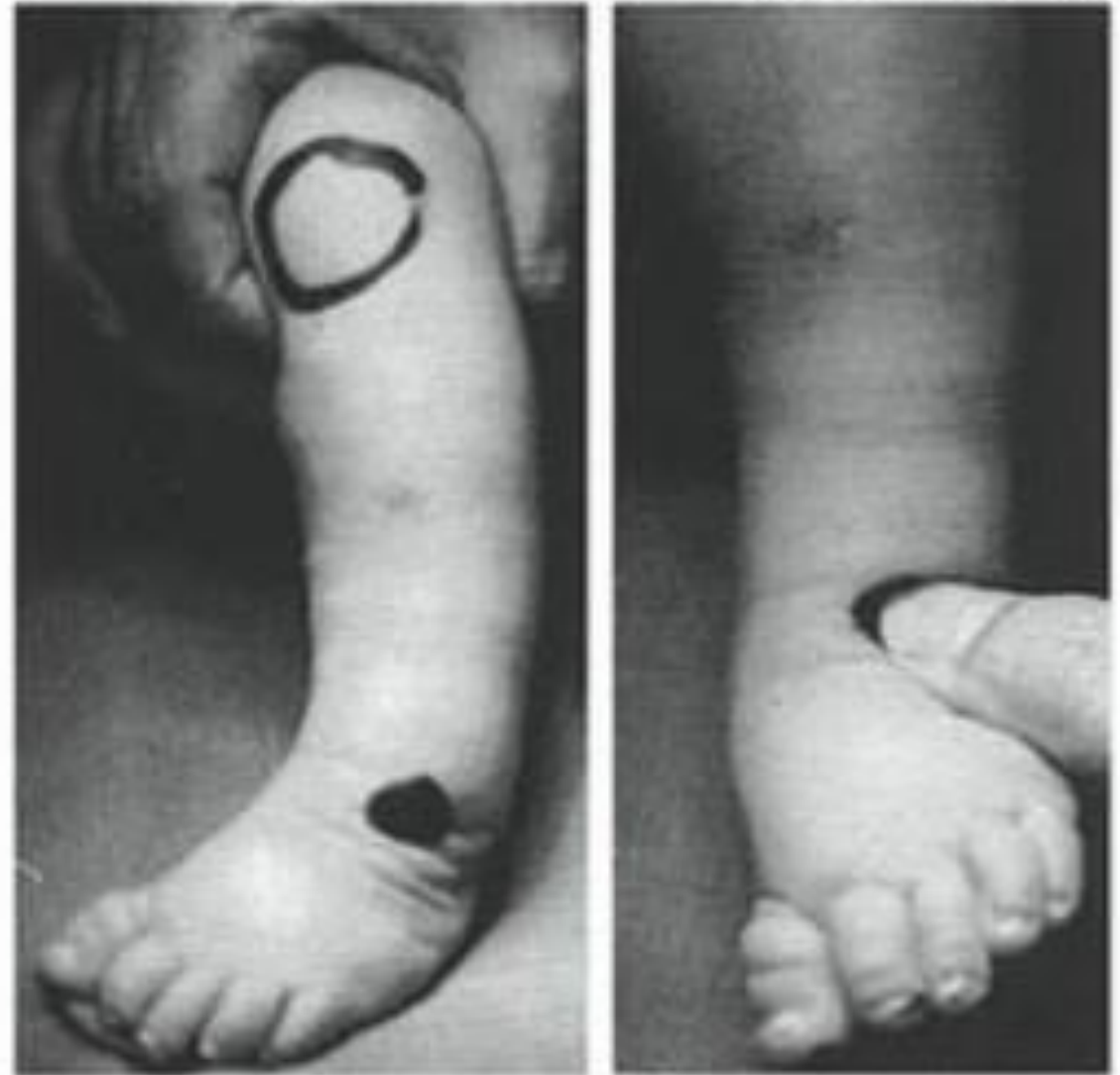


Varus deviations, reducibility to 0°: 2 points



Dorsal aspect

Adduction & supination  
of the forefoot



Derotation of calcaneopedal block: reducibility to  $-10^\circ$ ; 1 points

Plantar side

Adduction of the  
forefoot



Adduction of forefoot,  
reducibility to 0°: 2 points

Medial side

# Cavus Medial Crease



Medial crease: 1 point



Cavus foot: 1 point (for this foot, 1 more point for the medial crease and another point for the posterior crease)



# Dimeglio Classification

- An alternative classification was proposed by Dimeglio. Four major components of clubfoot are identified

1. Equinus . ١

2. Heel varus . ٢

3. Medial rotation of calcaneopedal axis . ٣

4. Forefoot adductus . ٤

- Each of these is graded clinically from 1 (most mild) to 4 (most severe).

- Four other parameters are also scored on points:

1. Posterior crease . ١

2. Medial crease . ٢

3. Cavus . ٣

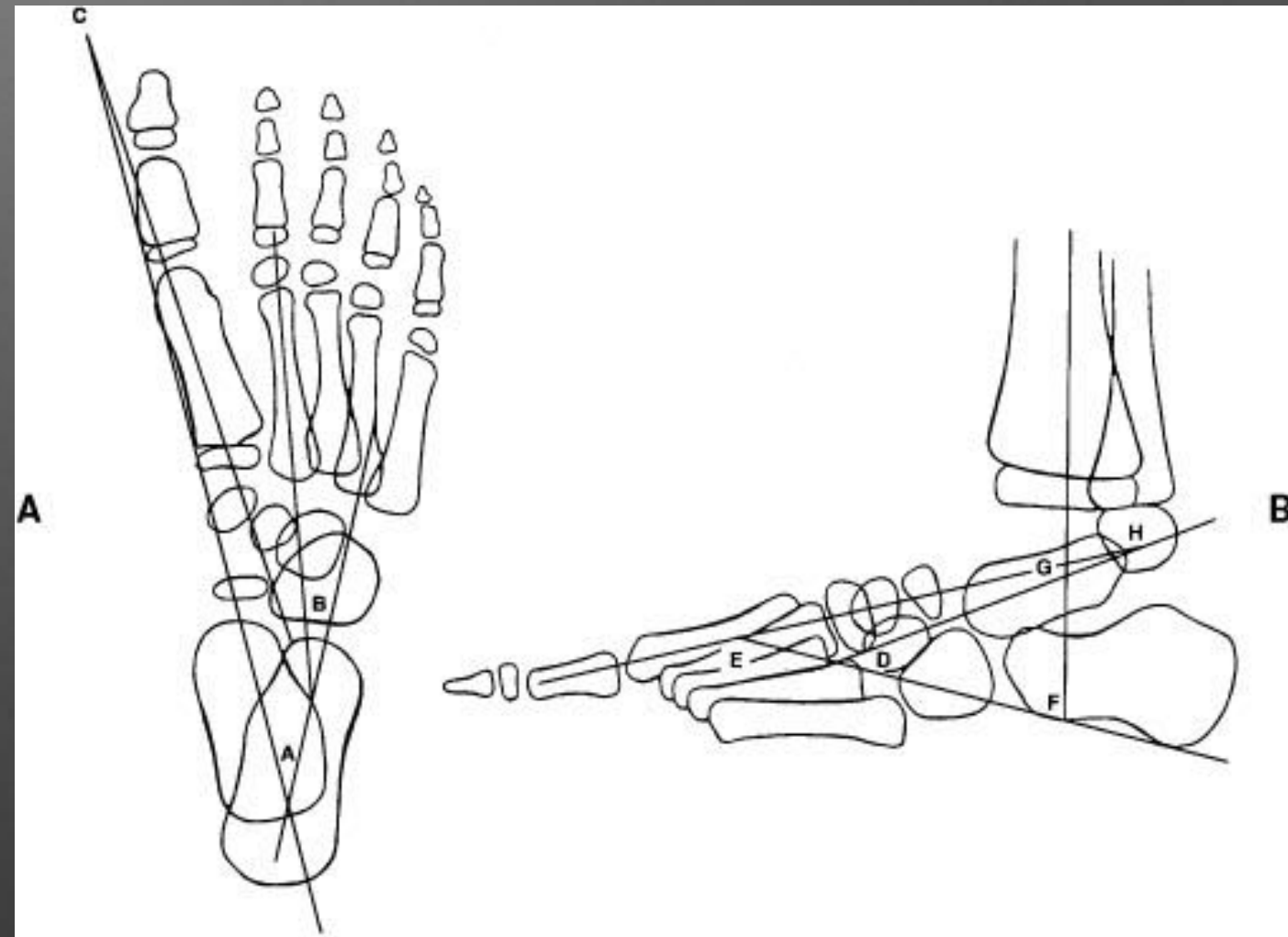
4. Poor muscle condition . ٤

# Severity / Dimeglio Scoring

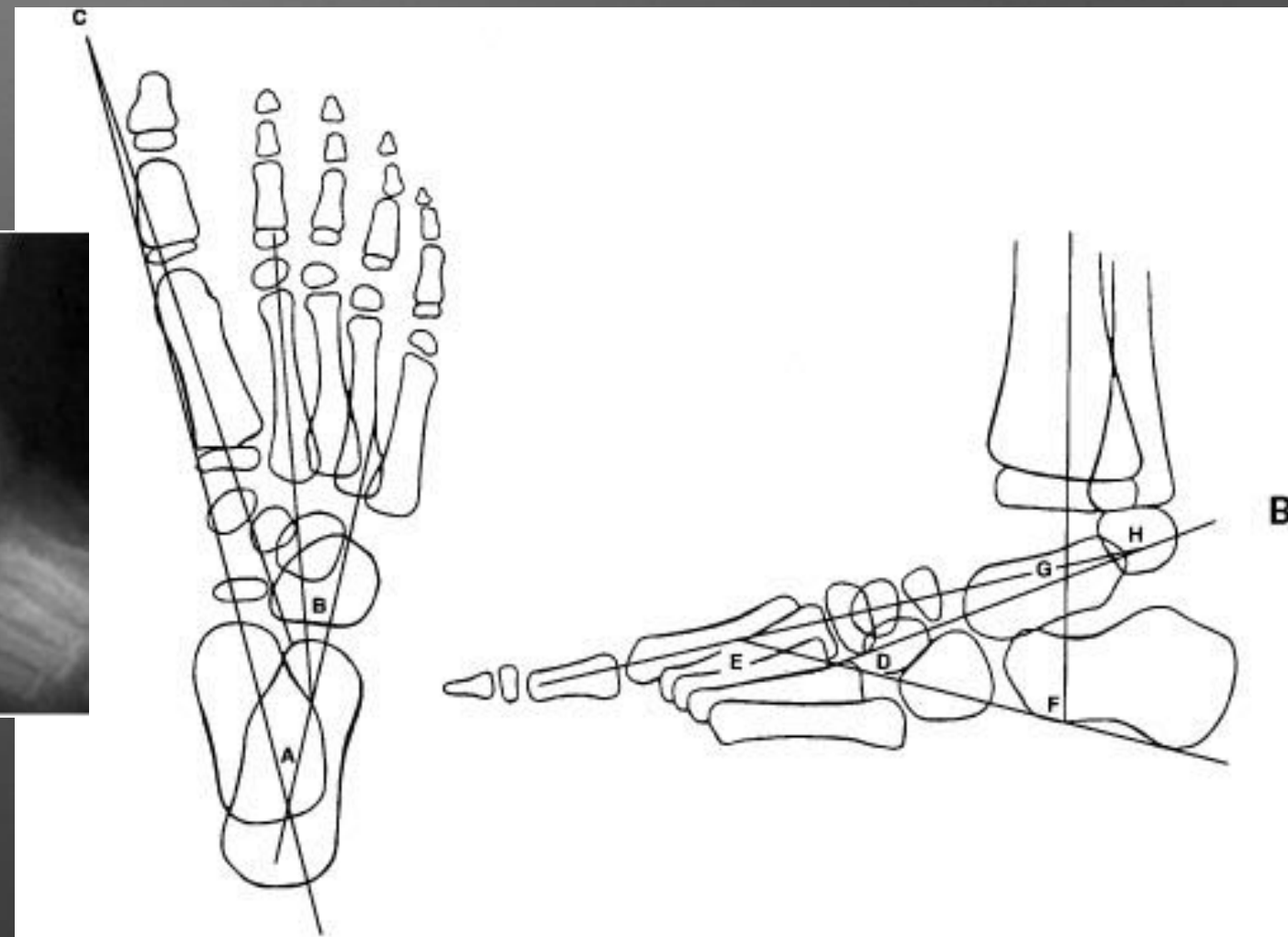
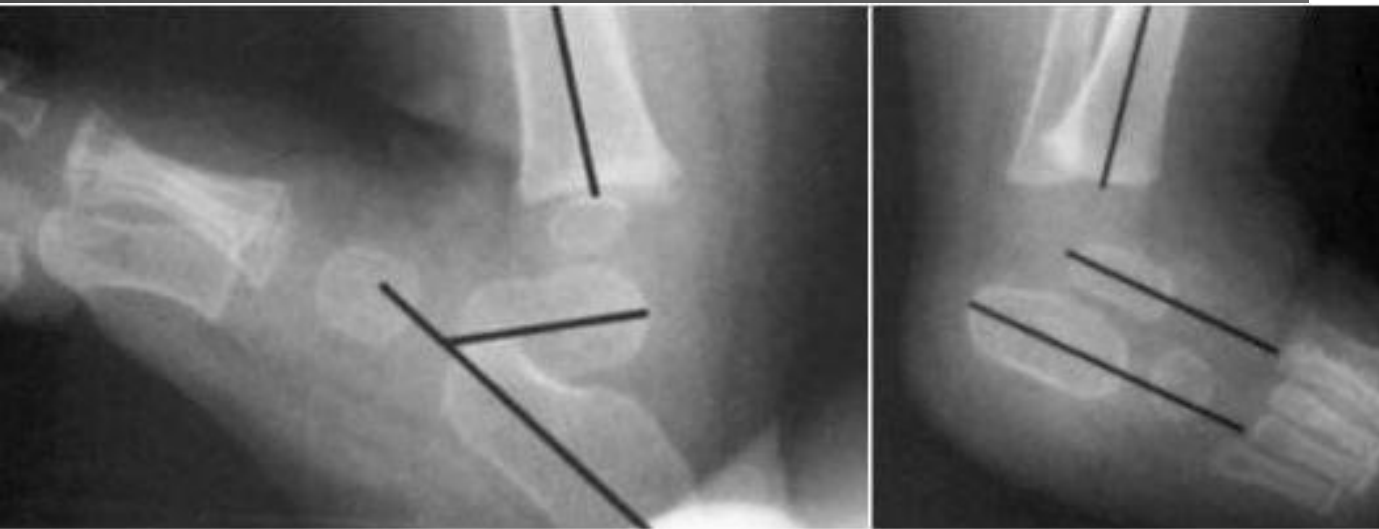
- Stiff (irreducible/very severe) •
- Severe (slightly reducible/severe) •
- Mild (partially reducible/moderate) •
- Postural (totally reducible/moderate) •



# Radiologic evaluation



# Radiologic evaluation



- Anteroposterior

- {parallelism of talus and calcaneus} Talocalcaneal angle ... { calcaneus}
- {{forefoot adduction} Talo-first metatarsal angle ...}
- Calcaneo-fifth metatarsal angle
- Calcaneo-second metatarsal angle

(Navicular and cuboid positions (calcaneocuboid deformity) •

- Lateral

Lateral

- Talocalcaneal angle ... 50–25 Talocalcaneal angle ... •
- Tibiocalcaneal angle ... 40–10 Tibiocalcaneal angle ... •
- Talo-first metatarsal angle Mery's angle {Cavus •



# Treatment

# Non Operative treatment

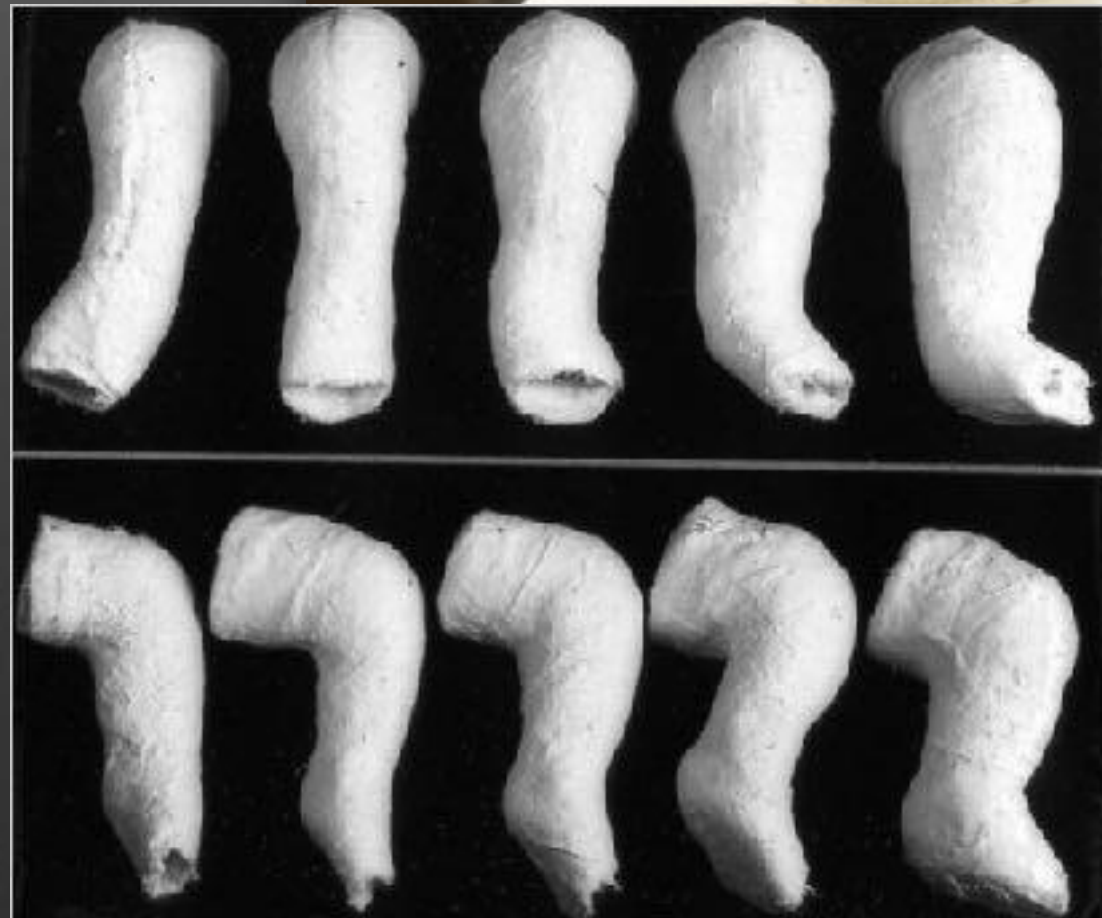
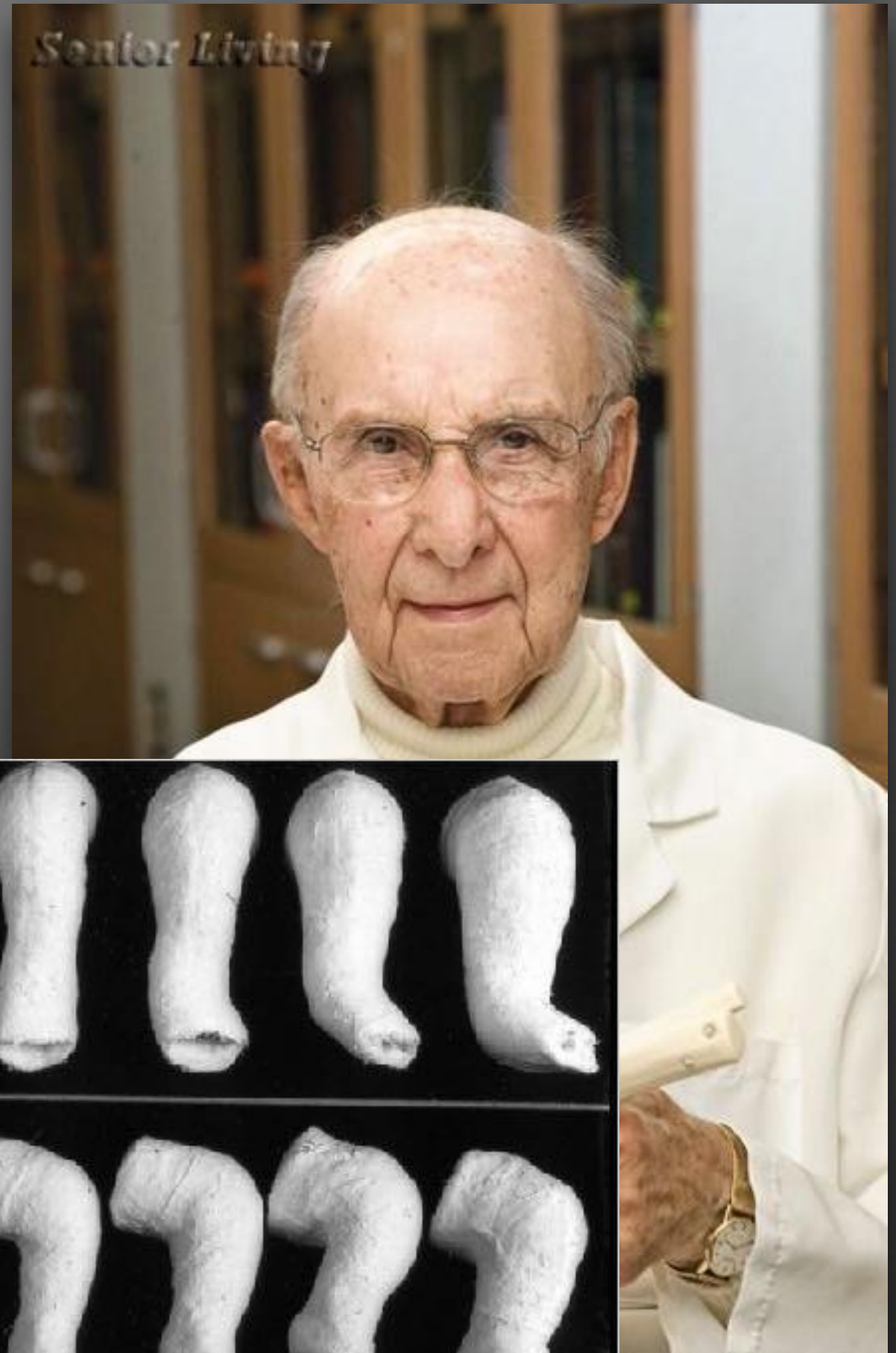
Ignacio Ponseti, MD  
s1940 early

**The New York Times**

October 23, 2009

Ignacio Ponseti, Hero to Many  
95 With Clubfoot, Dies at

*Senior Living*



# Ponseti Technique

1. weekly Serial casting for 4-6 weeks
2. Final cast +/- Tendo-Achilles tenotomy 1 month
3. Denis-Brown splint day for 3 months
4. Denis-Brown splint, night time for 3-4 years

**95% Success rate**



# Weekly serial casting

- Weekly corrective serial casting
- Correction order is **CAVE**:
  - Cavus      Cavus
  - Adduction & supination of the forefoot      the forefoot
  - Varus of the heel      Varus of the heel
  - Equinus      Equinus









# Clubfoot treatment over 4 – 6 weeks



Stage 1



Stage 2



Stage 3



Stage 4



Stage 5





# Final cast + tendo-Achilles tenotomy







# Denis-Brown Splint

- months 3 h/day for the first 23
- 3-4 night-time bracing for years



# Principles of treatment

days postnatally - The 15 st 1  
Golden Period

- Early correction
- Overcorrection
- Maintenance
- Supervision

30% Recurrence rate is up to



# Surgical treatment

1. Soft tissue release ... Posteromedial release .1)

Combined Soft tissue and Bony Procedure ... Lateral column shortening +/- medial column lengthening .2)

- Cuboid decancellation •
- Evan's Procedure •
- Lichtblau anterior calcaneal process resection •
- Dwyer's osteotomy •

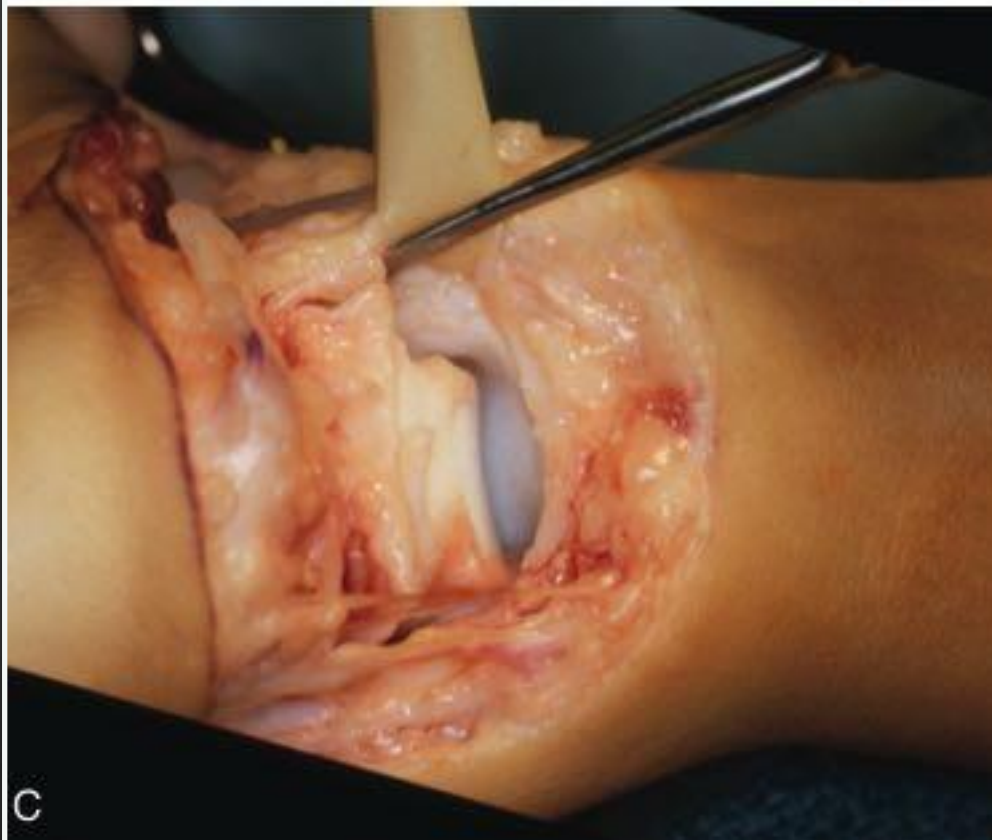
3. Bony Procedure ... Bony Procedure .3)

a. Lambrindui Arthrodesis .a

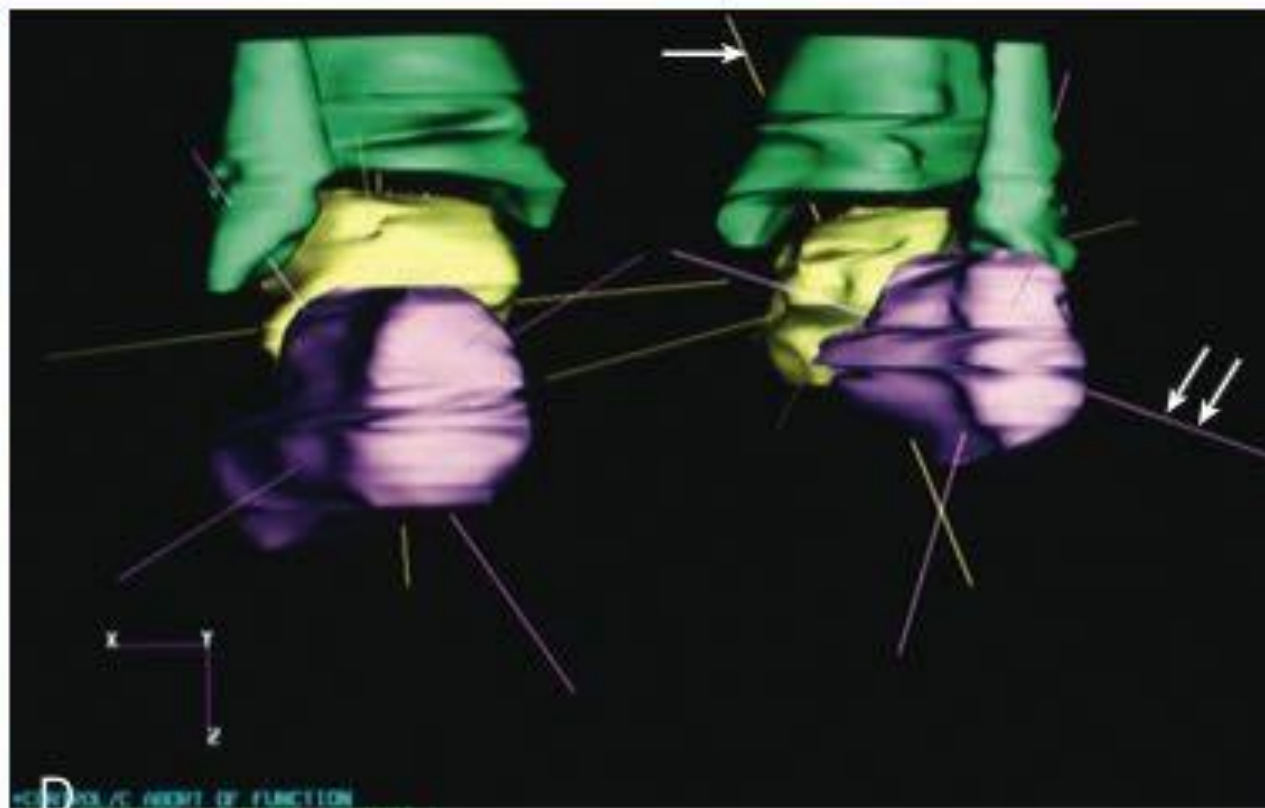
b. Triple Arthrodesis .b

4. Ilizarov Treatment .4

# Posteromedial release







- Cuboid decancellation
- Evan's Procedure
- Lichtblau anterior calcaneal process resection
- Dwyer's osteotomy

Foot in 20° varus deformity



Skin incision centered over anterolateral calcaneus and posterolateral cuboid

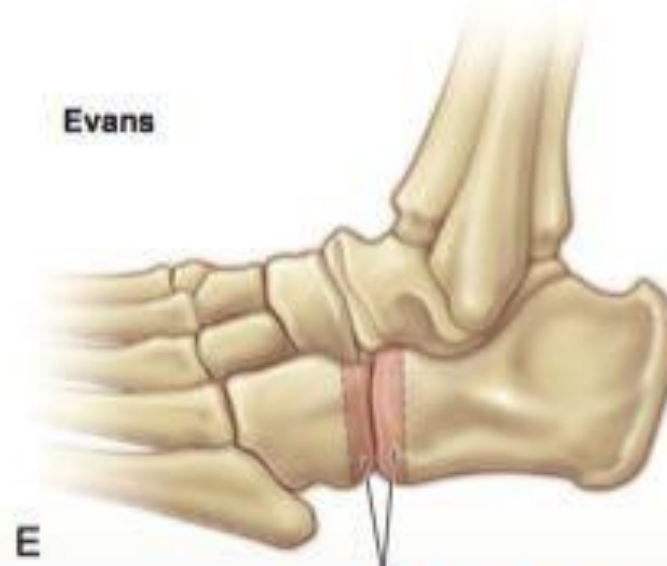


3/8" wedge resection of anterior end of calcaneus; articular cartilage not disturbed



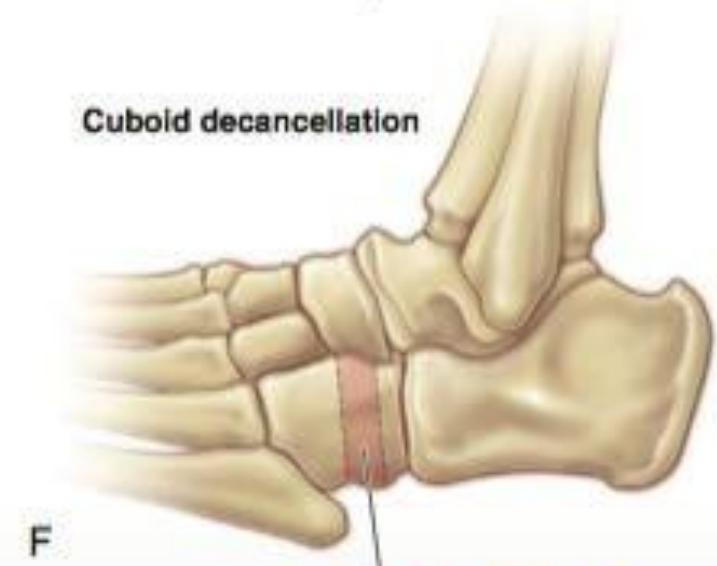
3/8" wedge resection of anterior end of calcaneus including calcaneal articular cartilage

Evans



Resection and fusion of calcaneocuboid joint

Cuboid decancellation



Wedge to be resected

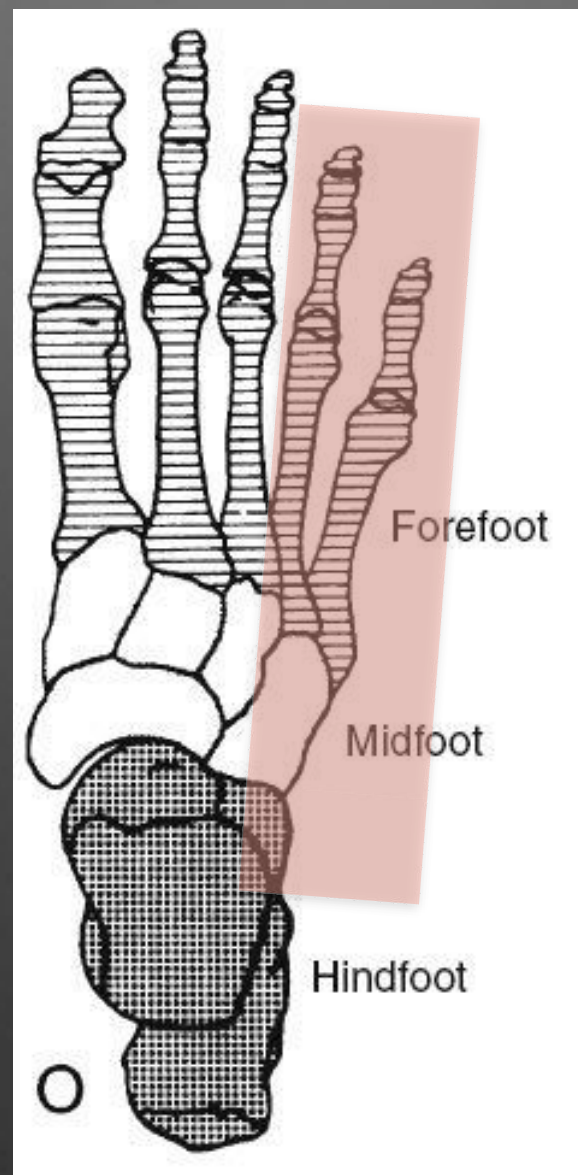
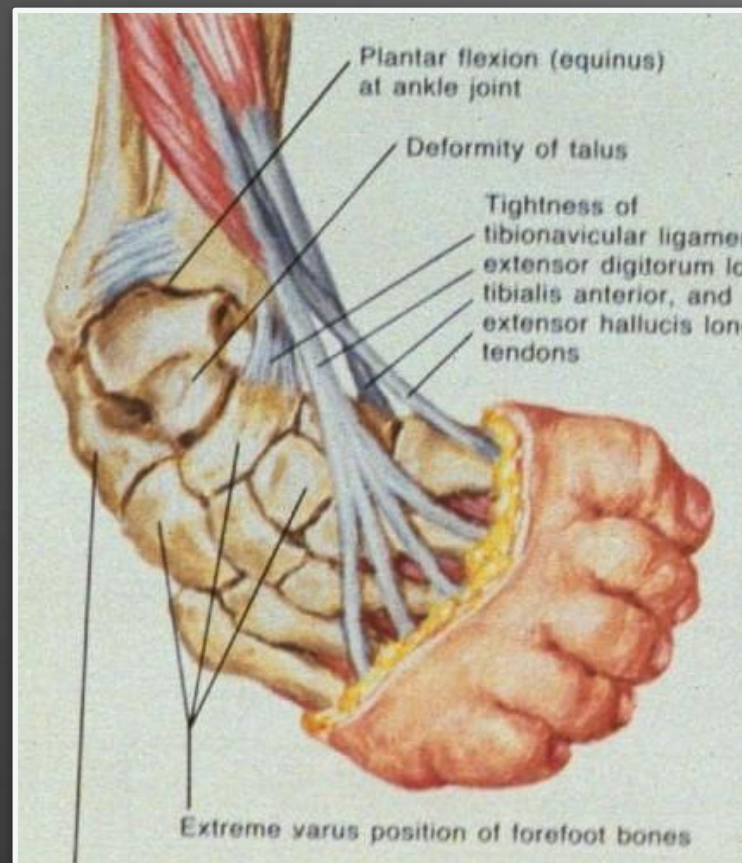


- Cuboid decancellation •
- Evan's Procedure •
- Lichtblau anterior calcaneal process resection •
- Dwyer's osteotomy •

C



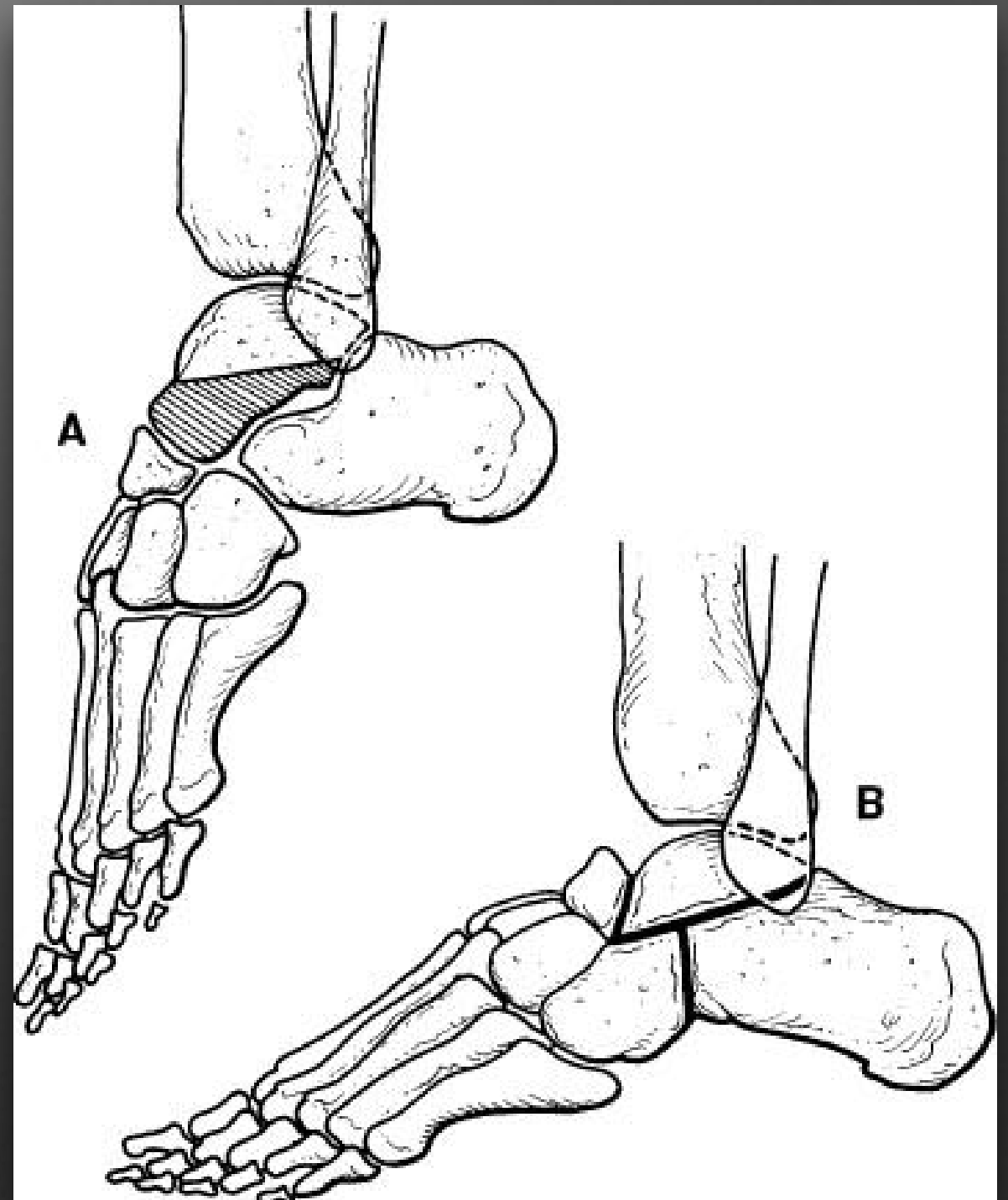
# Evan's Procedure



- Age at the age of 6y
- Posteromedial release +  
• Calcaneocuboid fusion

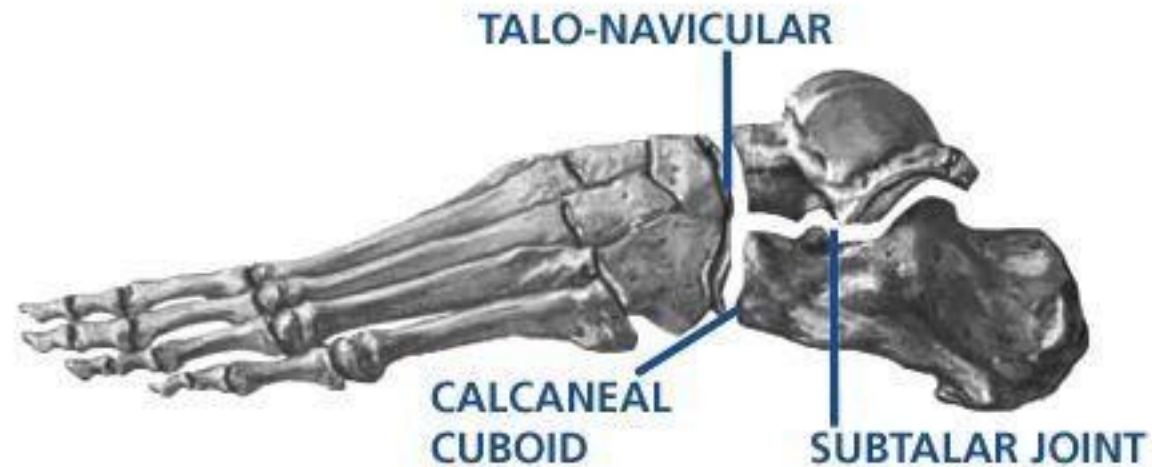
# Lambrinudi Arthrodesis

- y10Age
- Resection of the head and neck of the talus to correct the equinus deformity

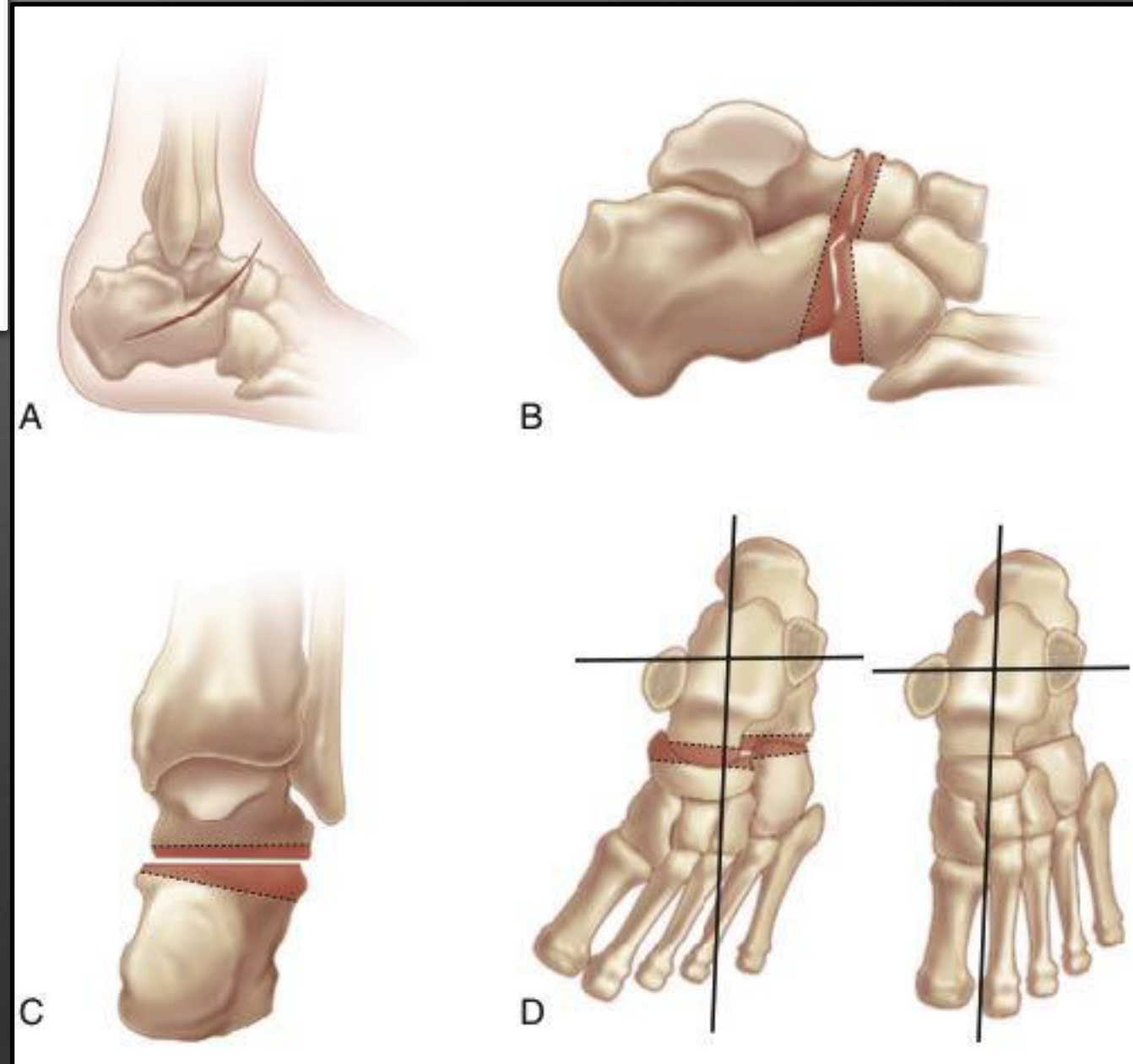




# Triple Arthrodesis

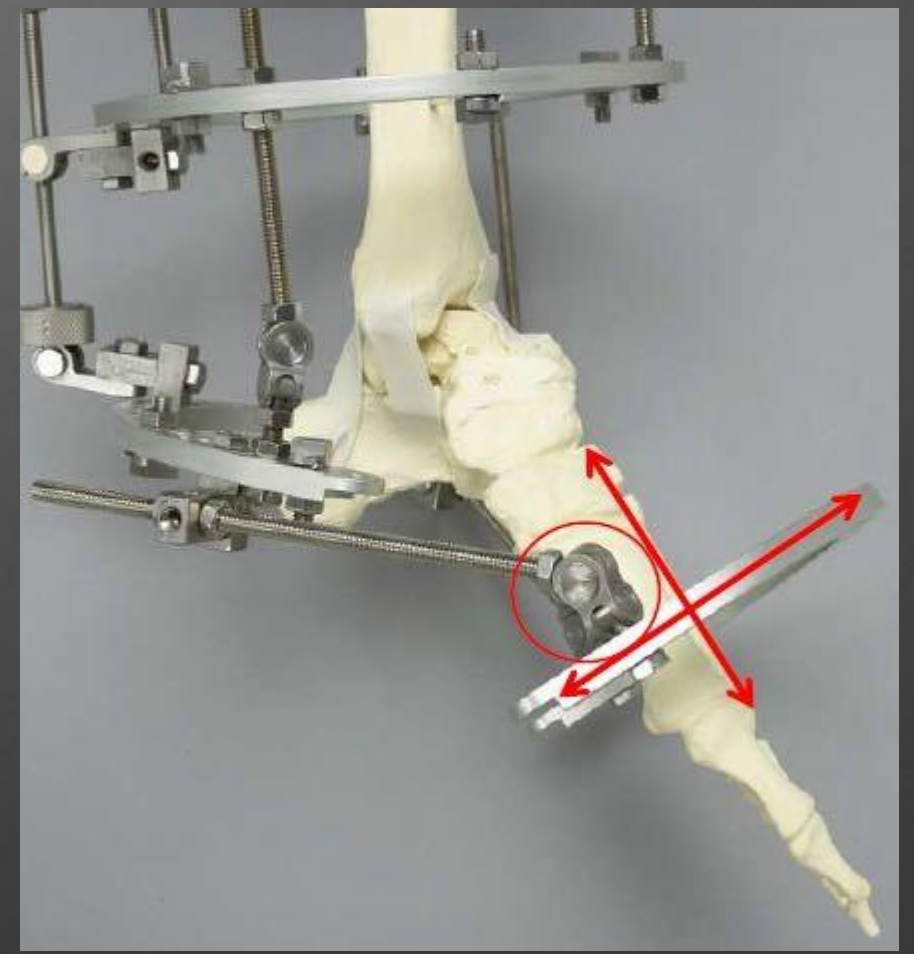
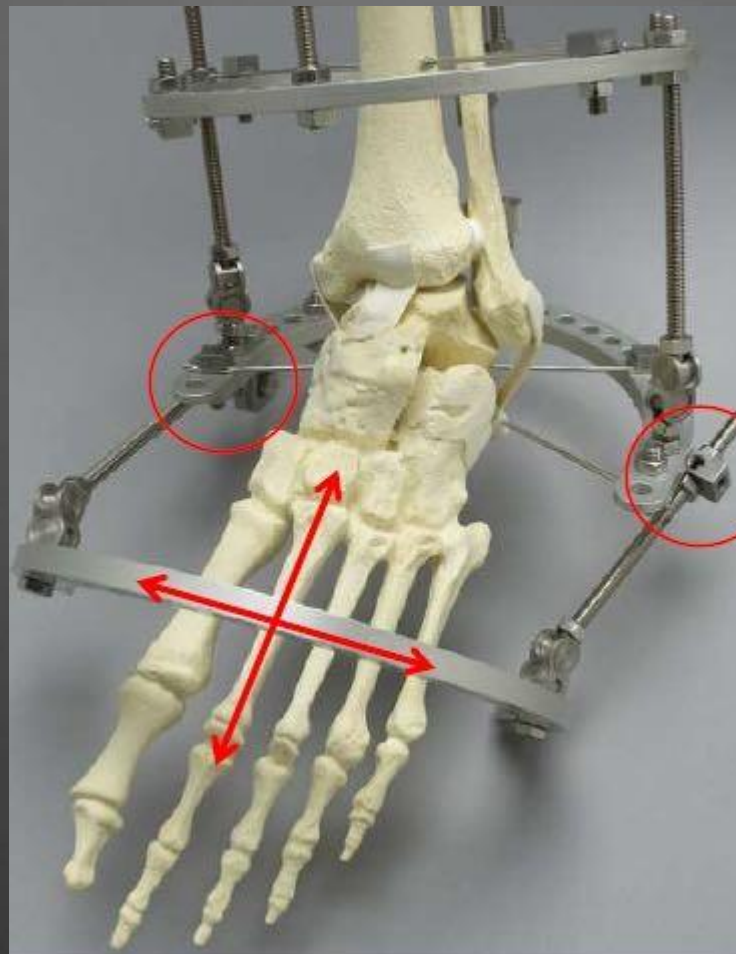
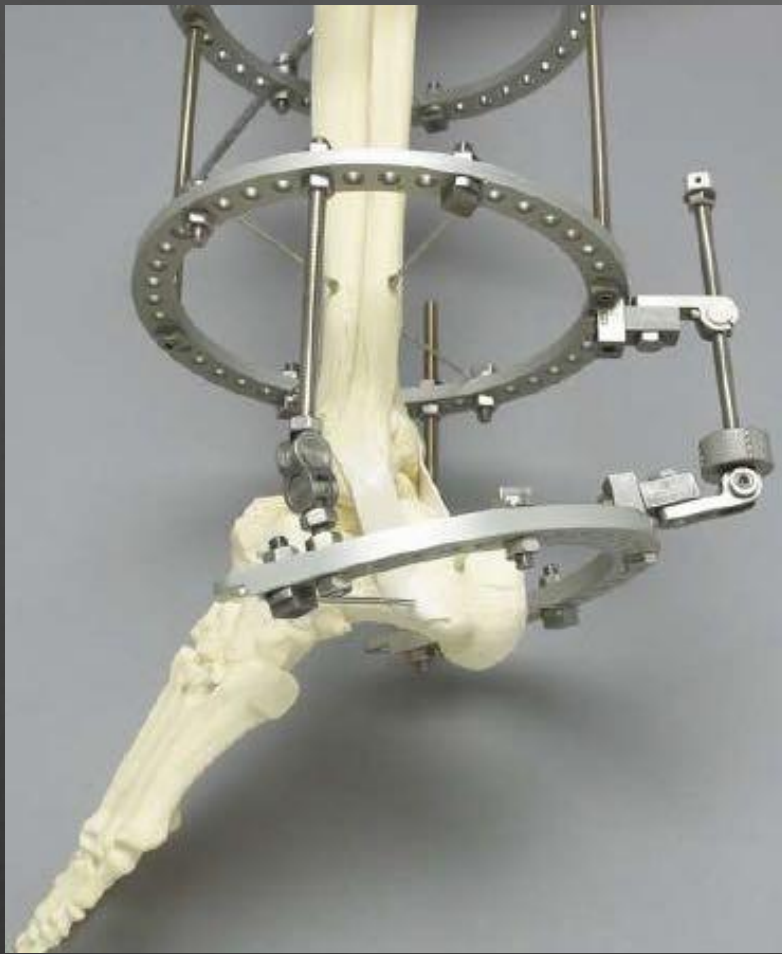


- y12 Age
- Fusion of the subtalar + Talonavicular + Calcaneocuboid joints





# Ilizarov Treatment











**Thank you**