Metatarsus adductus, Skew foot, Club foot

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장 현 정

Metatarsus adductus

Epidemiology and Etiology

- 0.1 - 12% with higher number for multiple birth
- Deformation and compression from intrauterine crowding or positioning
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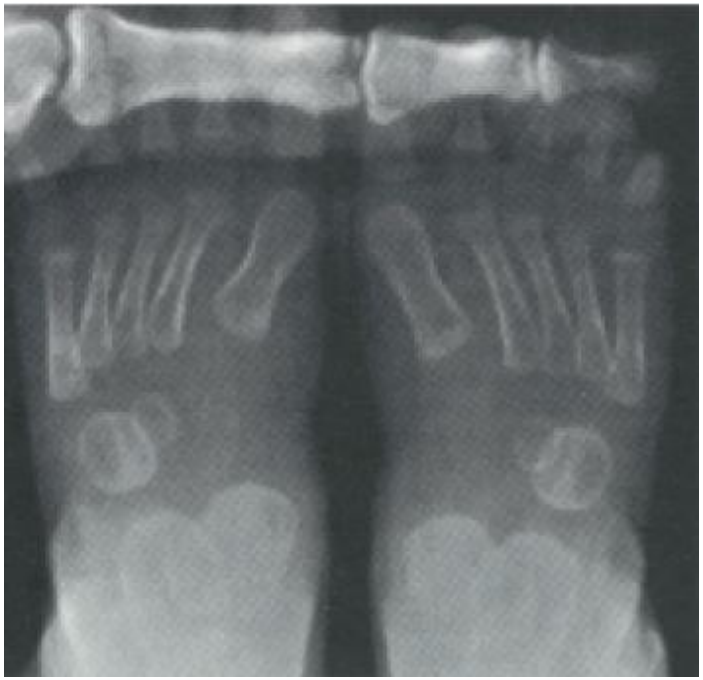


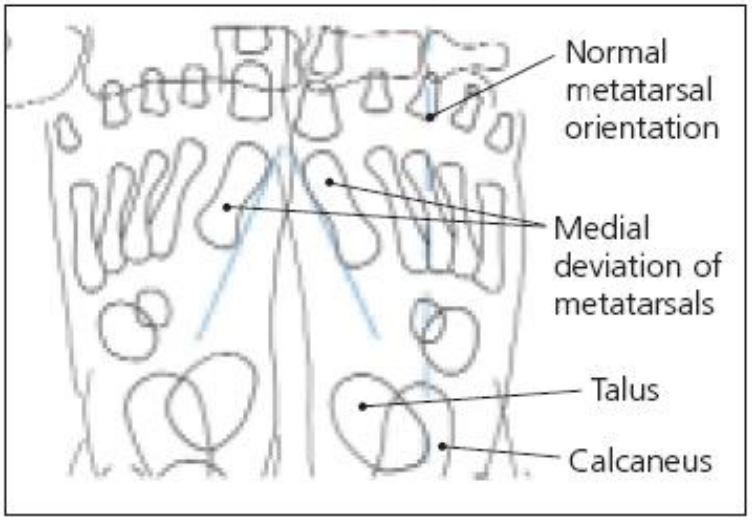


FIGURE 2. Metatarsus adductus: medial deviation of all metatarsals with normal relationship between talus and calcaneus.

Clinical evaluation

- On inspection

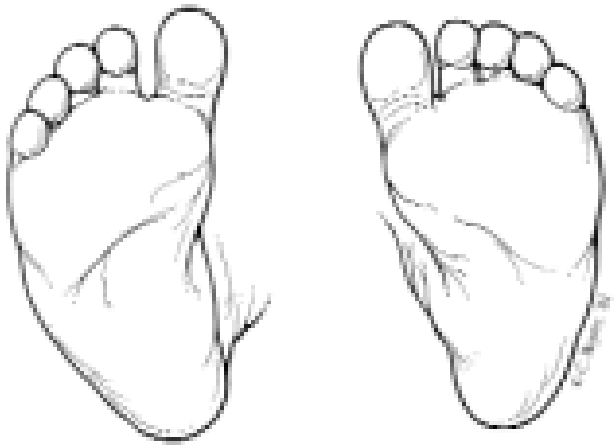
  Toe angles abruptly toward midlin

  C-shaped lateral foot border

  Prominent styloid process of 5th m

  Splay between great and 2nd toes

  Deep skin cleft at medial midfoot



Clinical evaluation

- “V”-finger test

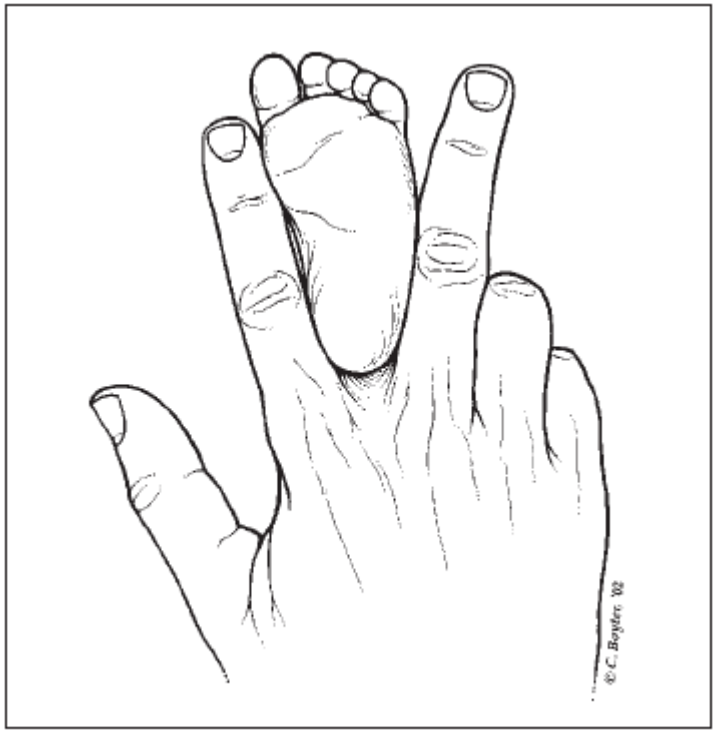


FIGURE 4. “V”-finger test.

Clinical evaluation

- **Flexibility**

  Fixing hindfoot in neutral position

→ Gently manipulating the midfoot and forefoot to more lateral position

- Classification

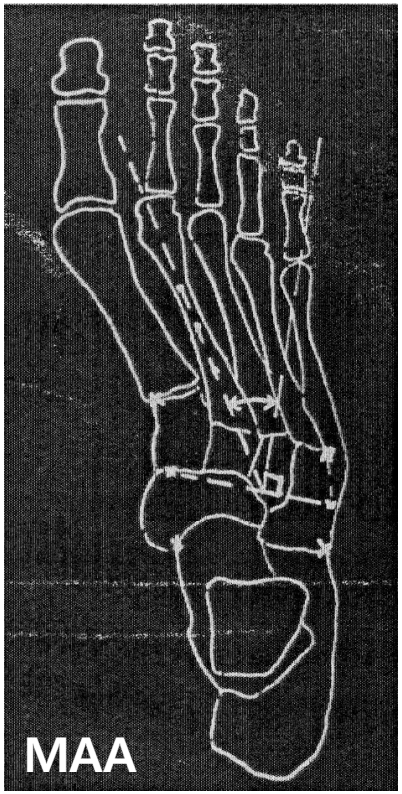
→ Flexible / semiflexible or semirigid / rigid

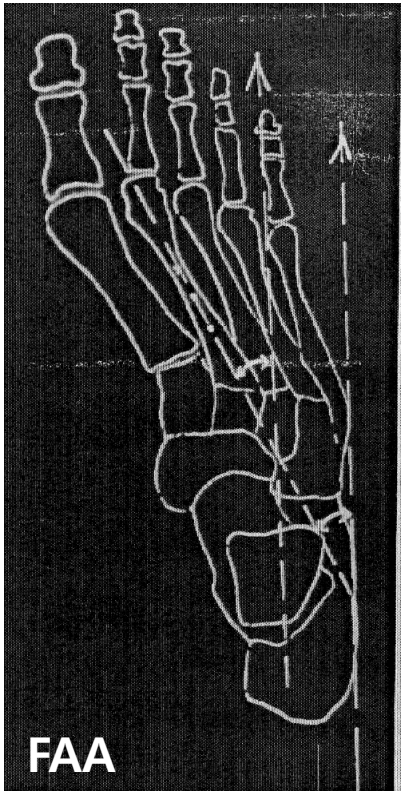
Radiographic evaluation

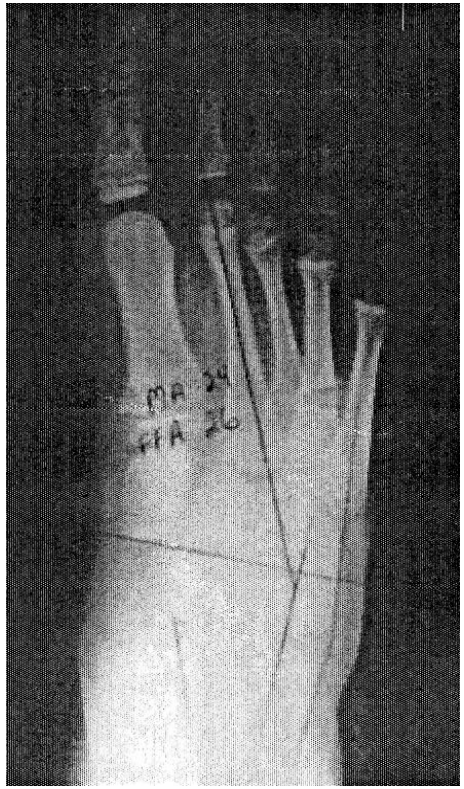
- Not imperative (in newborn foot)
- Difficult to reproduce, esp. infant & toddler foot
- Age & flexibility : better prognosticating factor
- Confirm presence of complex deformities or presence of rearfoot compensation and should still be obtained

Radiographic evaluation

- Valuable, diagnostic, prognosticating tool
- Initial AP radiograph







Treatment

- Based on severity but controversial

  - Some authors advocate only observation without active intervention for mild case

  - Others intervene early in all severe cases or by 2 months of age, if the condition is not resolved

  - Other authors recommend treatment as soon as possible, especially in moderate to severe cases

Treatment

- Based on natural course of the condition

  - More conservative approach seems reasonable

  - 85-90% resolve by 1 year of age

  - 87% resolved by 6 years of age, with only about 4 % remaining at age 16

Treatment

- Central theme of treatment

1. Early diagnosis
2. Early appropriate level of treatment aimed at complete reduction of the deformity
3. Prevention

★ Flexibility & age

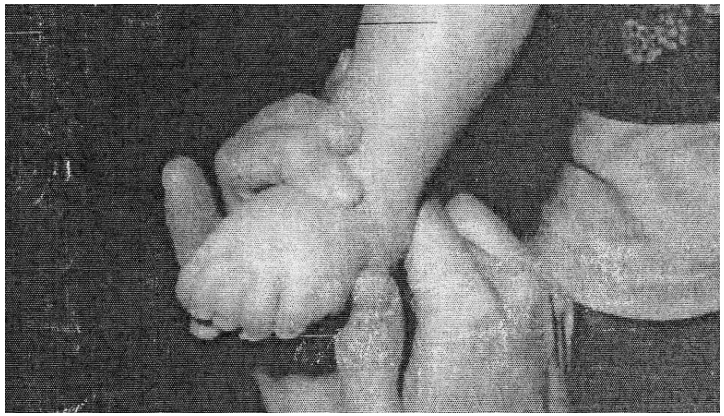
Treatment

- Mild (flexible, passively correctable)

Only parental reassurance

Daily passive strechting

(15-20 minutes / day over



Treatment

- Moderate (semi-flexible, reducible)

Stretching exercise at every diaper change

Aggressive and early use of passive stretching

Serial cast immobilization

Treatment

- Severe (rigid)

  - Excessive compensation at level of mediotarsal joint

  - Development of bunions, hammertoes, and others

Serial casting and bracing

Surgical treatment

Treatment

- Serial casting

  Helpful in children under 1 year of age

  Not to place the hindfoot in valgus

  → Create a skew foot deformity

- Surgery

  More rigid persistent deformity after age of 5

Treatment

- Long-standing untreated or undertreated metatarsus adductus

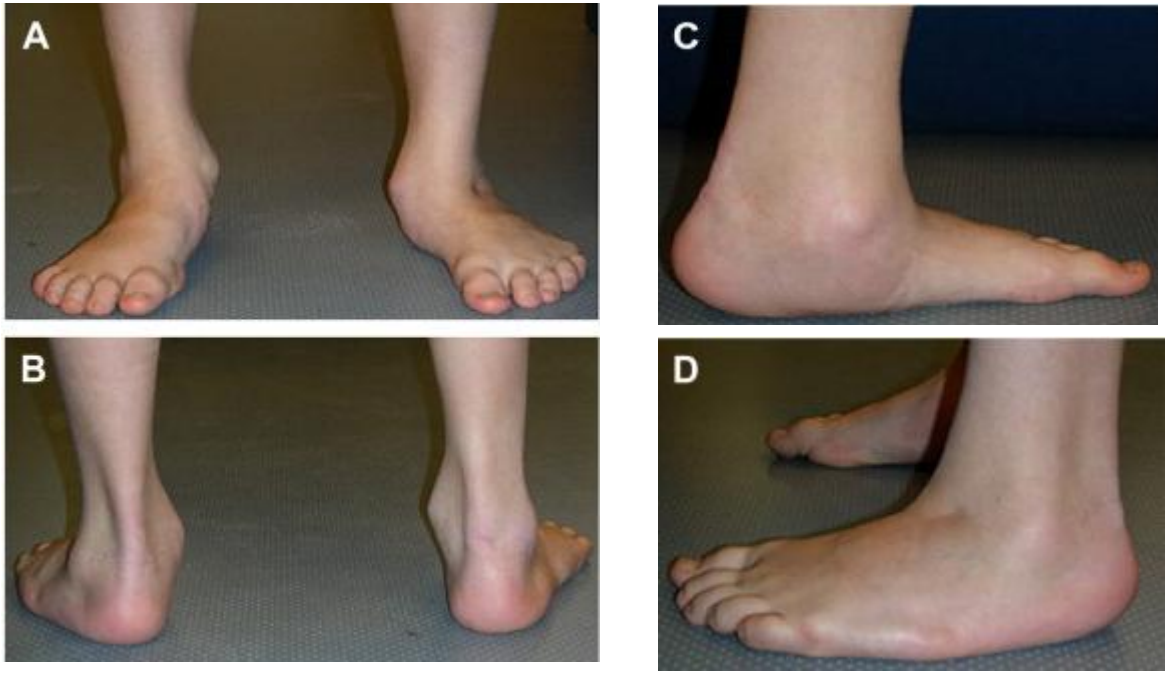
  - Formation of skewfoot deformity

  - Very significant symptoms and less successful treatment by nonoperative means

Skewfoot

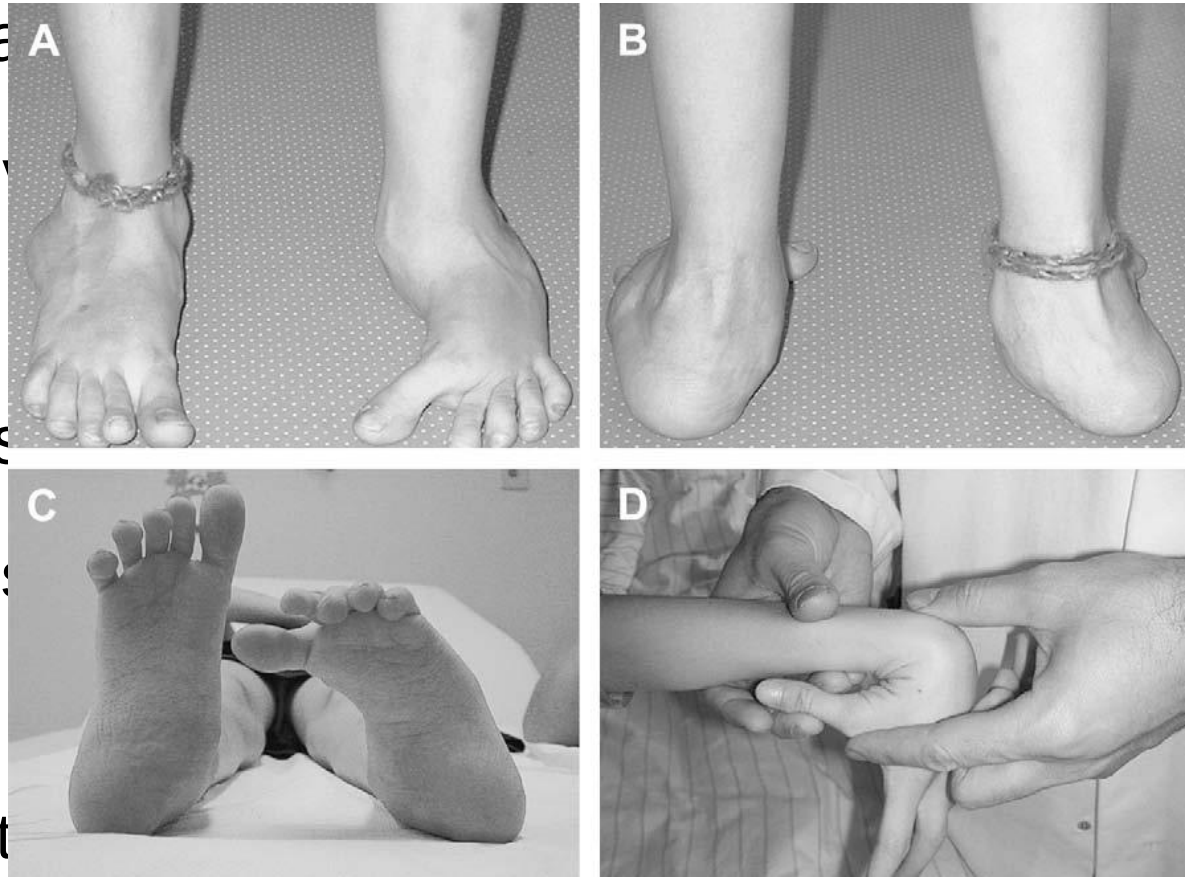
Terminology

- Rare deformity
- S-shaped foot, serpentine foot , Z-foot deformity
- Forefoot adduction and hindfoot valgus



Classification

- Congenital idiopa
  - Supple deformity,
  - Resolve with time
- Associated with s
  - Diastrophic dwarfi
  - Connective tissue
  - Rigid and difficult t



Classification

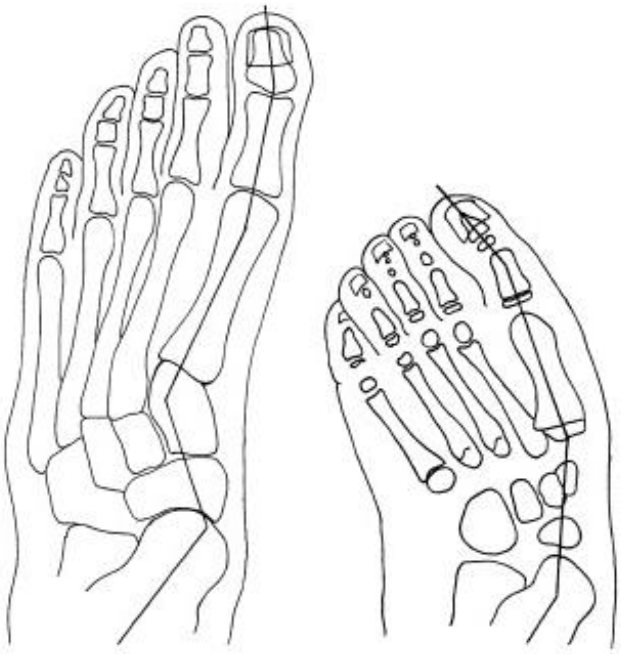
- Neurogenic
  - Cerebral palsy, Myelodysp
  - Due to muscular imbalanc
  - Faster progression
- Iatrogenic
  - Inappropriate casting or surgical intervention in club foot or metatarsus adductus

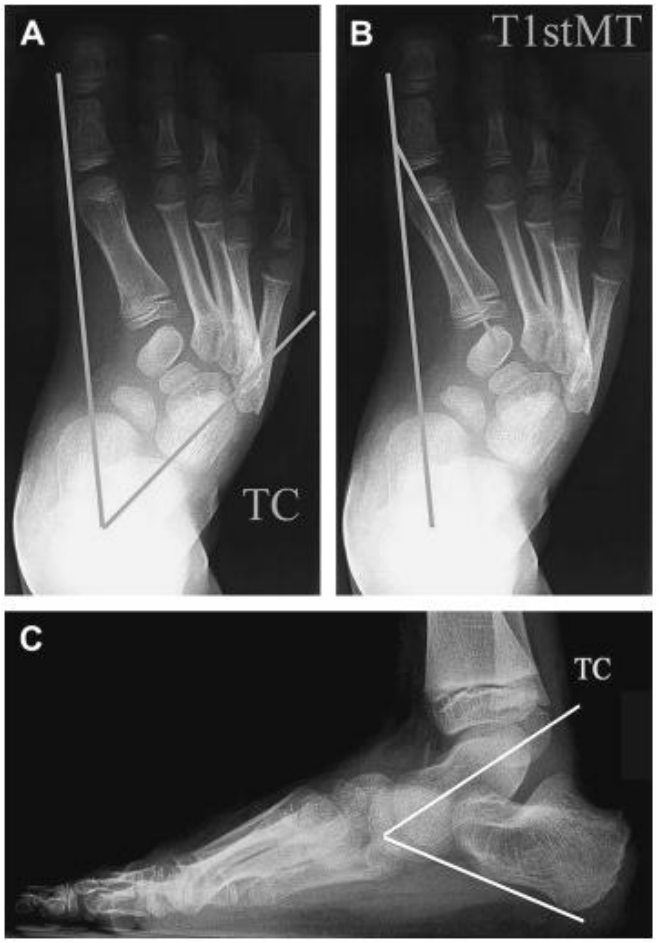
Clinical evaluation

- From plantar aspect
- Weight bearing
- Flexibility
- Hip & knee ROM
- “V-finger test” : not helpful

Radiologic assessment

- AP and lateral radiograph with weight bearing





Treatment

- Controversial : no therapeutic escalation
- Natural history : unknown
- Important to evaluate clinical response to treatment
- Measures of therapy
  - Manipulation
  - Serial casting
  - Orthoses
  - Surgical management

Treatment

★ Age and etiology

- Mild and flexible form

  Cast immobilization and shoe therapy

- Severe form

  Surgical intervention

  - Underlying neuromuscular condition

  - Affected on daily basis because of deformity

Club Foot

Termiology

- Talipes equinovarus
- Main component

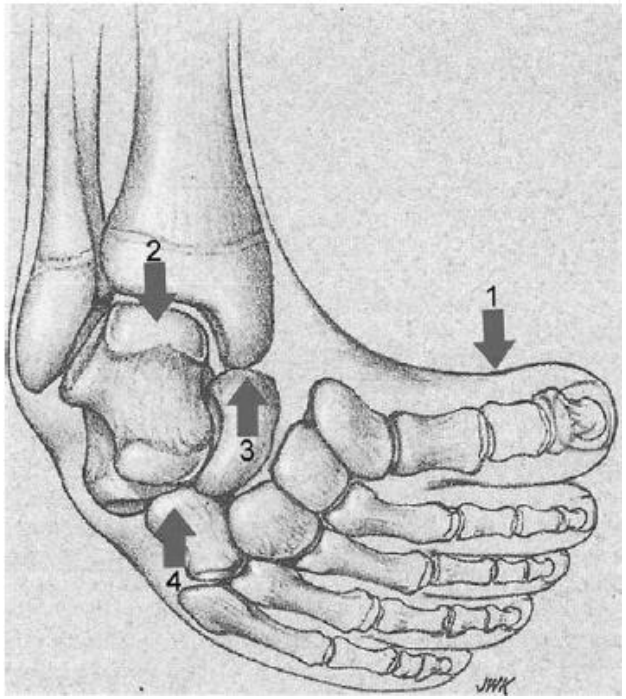
  - Adduction & supination of forefoot

  - Varus of hindfoot

  - Equinus of subtalar joint

  - Internal rotation of leg

Pathoanatomy



- Embryological and fetal specimen

1. Adduction & supination of forefoot
2. Anterior extrusion of talus with increased plantar and medial inclination of talar neck
3. Medial subluxation of navicular toward madial malleolus
4. Medial subluxation of cuboid in relation to anterior end of os calcis

Epidemiology

- One of the most common congenital deformity of the musculoskeletal system
- Incidence : 1-4 / 1,000 live births
- 0.6 – 6.8 / 1,000 → hereditary factor
- Higher incidence in male
- 30-50% : only one side involved

Classification

- Postural

  Benign, resolve completely with stretching & cast

- Idiopathic

  True congenital clubfoot of variable severity

- Neurogenic

  As seen in spina bifida

- Syndromic

  Associated with other anomalies, often quiet rigid

Pathogenesis

- Mechanical factors such as intrauterine molding and oligohydroamnios
- Early developmental arrest of foot
- Primary germ plasm defect in talus
- Primary dislocation of talo-navicular joint
- Muscle imbalance d/t developmental neurological deficit
- Medical retraction fibrosis

Clinical evaluation

- On inspection

  “Down and in” appearance

  Smaller foot

  Flexible, softer heel due to hypoplastic calcaneus

  Concave medial border with deep skin furrow

  Highly convex lateral border

Clinical evaluation

- On testing

  Pronounced tightness of Achilles tendon with very little dorsiflexion

Radiographic evaluation

- Roughly parallel axes of talus and calcaneus

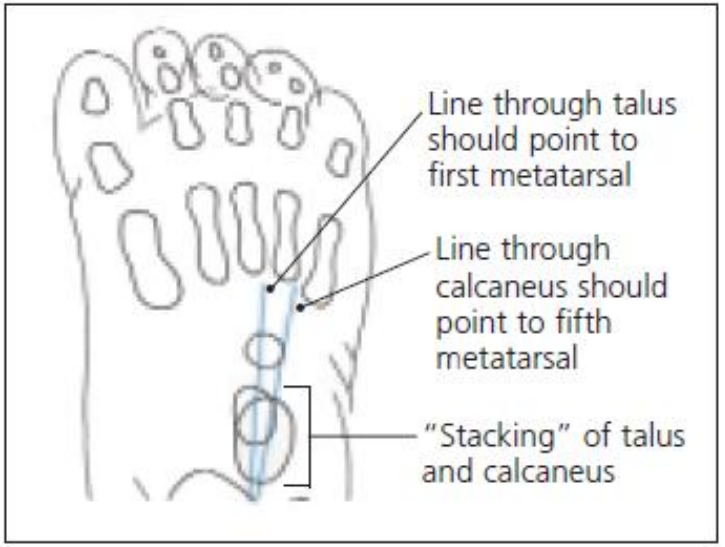


FIGURE 7. Radiographic projection of club-foot. Note parallel axes of talus and calcaneus.

Treatment

★ Started as soon as possible after birth

- Extrinsic (supple) type

  Positional or soft tissue deformity

  Treated by serial casting

- Intrinsic (rigid) type

  Manual reduction is impossible

  Eventually require surgery

Treatment

- Range of motion maintanence

  By passive exercise into dorsiflexion & eversion

- Plaster casting

  Attempt on all clubfoot as soon as practical

  Initially changed at semiweekly to weekly intervals

  Continue until deformity responds and corrected fully

Treatment

- Surgery

  Usually when child is 6-9 months of age

  Goal : stable, “platform-like” position for future ambulation

  Problems (1) leaving residual deformity

  (2) malcorrection

  (3) overcorrection → worsen problem

- Persistent deformity into adulthood

  Unstable ankle, lateral sprain, difficulty with weight bearing

Where are we going in 21th century?

1) In the future, better understanding of pathogenesis of deformity → A role for gene therapy in prevention?
2) In the future, intrauterine treatment that result in plantigrade foot at delivery?
3) Better clinical technique and better imaging modality → accurately compare ‘apples to apples’
4) Evidence-based medicine → to determine which modality produce optimal results

Where are we going in 21th century?

5) Patients will play more important role in determining optimal treatment outcome?
6) Use of platelet-derived factors for ligament healing
   → Role in treatment of clubfoot?
7) New therapy modality which soften and lengthen tight ligaments and muscles?
8) Better orthosis which overcome noncompliance?
9) Cost of applying these advances?

Thank you for attention