Introduction to clubfoot
Contents

• Introduction
• Clubfoot genetics
• Aetiology
• Disability
• Anatomy and pathophysiology
• Types of clubfoot
Clubfoot

- Congenital talipes equino-varus
- The commonest significant congenital deformity worldwide
- Caucasians
  - 1 per 1000 live births
- Africans
  - 2-3 per 1000
- Polynesians
  - 6 per 1000
Clubfoot - genetics

- Male : female ratio 3:1
- 40% bilateral
- 2\textsuperscript{nd} child in family with CTEV 1/35
- Monozygotic twins 32.5% coincidence
- Dizygotic 2.9%
- Probably multifactorial condition with polygenic antecedents
Clubfoot aetiology?

• Developmental arrest / delay
  – Foetal foot passes through equino-varus stage

• Intra-uterine moulding
  – Moulding can cause equinovarus position, but this is easily correctable and occurs late in pregnancy

• Retracting fibrosis / myofibroblast activity
  – Collagen / myofibroblasts, similar to Dupuytren’s
  – Cause / effect?

• Neuromuscular
  – Neuromuscular tissues of the calf
  – Association with spina bifida / CP
Clubfoot disability

- Children with clubfoot are physically disabled and socially & economically disadvantaged
- They have difficulty attending school
- Employment opportunities reduced
- Marriage prospects impaired
Clubfoot anatomy and pathophysiology
Contents

• Definitions of movements of tarsal bones
• The congenital clubfoot
• Types of clubfoot
Definitions of movements of Tarsal Bones/Foot

- **Adduction** = distal part moves towards median body plane
- **Abduction** = distal part moves away from median body plane
- **Flexion** = distal part moves plantarward
- **Extension** = distal part moves dorsally
- **Inversion** = plantar surface moves towards median body plane
Definitions of movements of Tarsal Bones/Foot

- **Supination** = Adduction + Flexion + Inversion
- **Pronation** = Abduction + Extension + Eversion
- **Equinus** = Increase plantarflexion of the foot
- **Cavus** = Increase of the height of the medial arch of the foot
- **Eversion** = plantar surface moves away from median body plane
The Congenital Clubfoot

- Cavus
- Adductus (midfoot)
- Varus (hindfoot)
- Equinus (hindfoot)
Severe tibio-talar plantar flexion

Medial talar neck inclination

Severe medial displacement of navicular

Wedge shaped head of talus

Adducted and inverted calcaneus

Wedge shaped distal calcaneal articular surface.

Wedge shaped navicular

Medially displaced cuboid
Types of clubfoot (not all clubfeet are the same.)

- Untreated
- Treated
- Resistant
- Recurrent
- Neglected
- Complex
Untreated clubfoot

- All untreated clubfeet under 2 yr. of age
  - Most feet under 9 months of age completely correctable
  - Between 9 months of age and 2 yr.-considerable correction may occur
Treated clubfoot

- Has corrected with Ponseti treatment

- Braced fulltime for 3 months, and then at night for 2-4 years
Resistant / Atypical Clubfoot

- Does not / difficult to correct with Ponseti treatment
- Hindfoot & midfoot contracture
- Short, fat swollen foot
- Transverse plantar crease
- Often seen as part of syndrome
Recurrent Clubfoot

- A treated clubfoot that later develops recurrence
  - Supination of entire foot (Overactive tibialis anterior)
  - Equinus of hindfoot (Overactive gastrosoleus complex)
Neglected Clubfoot

- An untreated clubfoot in a child more than 2 yrs old.
- Usually has bony deformity
- Difficult to treat by Ponseti method
- May need surgical correction
Complex Clubfoot

• Any clubfoot that has received any treatment apart from Ponseti Management (eg: Kite manipulations or surgery)
• May have added complexity because of effects of surgical scarring etc
• Evaluation needs to be individualized