Common Pediatric Foot Deformities
Angular deformities of LL:
- Bow legs.
- Knock knees.
Rotational deformities of LL:
- In-toeing.
- Ex-toeing.
Leg aches.
CDH.
Feet problems.
Irritable hip.
Angular LL Deformities of LL
Angular Deformities
Nomenclature

Bow legs

Knock knees

Genu Varus

Genu Valgus
Angular Deformities
Range of Normal Varies With Age

- During first year: Lateral bowing of Tibiae
- During second year: Bow legs (knees & tibiae)
- Between 3 – 4 years: Knock knees
Angular Deformities Evaluation

Should differentiate between “physiologic” and “pathologic” deformities
Angular Deformities Evaluation

Physiologic

- Symmetrical
- Mild – moderate
- Regressive
- Generalized
- Expected for age

Pathologic

- Asymmetrical
- Severe
- Progressive
- Localized
- Not expected for age
Angular Deformities
Causes

Physiologic

- Normal – for age
- Exaggerated:
  - Overweight
  - Early wt. bearing
  - Use of walker?

Pathologic

- Rickets
- Endocrine disturbance
- Metabolic disease
- Injury to Epiphys. Plate
- Infection / Trauma
- Idiopathic
Angular Deformities
Evaluation

Symmetrical deformity
Angular Deformities
Evaluation

Asymmetrical Deformity
Angular Deformities
Evaluation

Generalized deformity
Angular Deformities

Evaluation

Localized deformity

Blount’s
Angular Deformities Evaluation

Localized deformity

Rickets
Angular Deformities Evaluation

Measure Angulation
( standing / supine )

in bow legs / genu varum

Inter-condylar distance
Angular Deformities Evaluation

Measure Angulation (standing / supine)

in knock knees / genu valgum

Inter-malleolar distance
Angular Deformities Evaluation

Measure Angulation

Use goneometer
measures angles directly
Angular Deformities Evaluation

Investigations / Laboratory

- Serum Calcium / Phosphorous?
- Serum Alkaline Phosphatase
- Serum Creatinine / Urea – Renal function
Angular Deformities Evaluation

Investigations / Radiological

X-ray when severe or possibly pathologic

• **Standing AP film**
  – long film (hips to ankles) with patellae directed forwards

• **Look for diseases**:  
  – Rickets / Tibia vara (Blount’s) / Epiphyseal injury..  
  – Measure angles.
Angular Deformities Evaluation

Investigations / Radiological

Medial Physeal Slope

Femoral-Tibial Axis
Angular Deformities
When To Refer?

• **Pathologic deformities:**
  Asymmetrical.
  Localized.
  Progressive.
  Not expected for age.

• **Exaggerated physiologic deformities:**
  Definition?
Angular Deformities Surgery
Rotational LL Deformities

In-toeing / Ex-toeing

• Frequently seen.
• Concerns parents.
• Frequently prompts varieties of treatment. (often un-necessary / incorrect)
Rotational Deformities

- **Level of affection:**
  - Femur
  - Tibia
  - Foot
Rotational Deformities
Femur

Ante-version = more medial rotation
Retro-version = more lateral rotation
Rotational Deformities
Normal Development

- **Femur** : Ante-version :
  - 30 degrees at birth.
  - 10 degrees at maturity.

- **Tibia** : Lateral rotation :
  - 5 degrees at birth.
  - 15 degrees at maturity.
Rotational Deformities
Normal Development

Both Femur and Tibia laterally rotate with growth in children

- Medial Tibial torsion and Femoral ante-version improve (reduce) with time.
- Lateral Tibial torsion usually worsens with growth.
Rotational Deformities
Clinical Examination

Rotational Profile

• At which level is the rotational deformity?
• How severe is the rotational deformity?
• **Four components:**
  1- Foot propagation angle.
  2- Assess femoral rotational arc.
  3- Assess tibial rotational arc.
  4- Foot assessment.
Rotational Deformities
Clinical Examination

Rotational Profile

1- Foot propagation angle – Walking

Normal Range:
+10° - 10°

? In Eastern Societies
+25° - 10°
Rotational Deformities
Clinical Examination

Rotational Profile
2- Assess Femoral Rotational Arc

Supine
Extended
Rotational Deformities
Clinical Examination

Rotational Profile
2- Assess Femoral Rotational Arc

Supine flexed
Rotational Deformities
Clinical Examination

Rotational Profile
3- Tibial Rotational Arc
Thigh-foot angle in prone

foot position is critical
leave to fall into natural position
Rotational Deformities
Clinical Examination

Rotational Profile
4- Foot assessment

- Metatarsus adductus
- Searching big toe
- Everted foot
- Flat foot
Rotational Deformities
Common Presentations

Infants

- **Out-toeing**: Normal
  - seen when infant positioned upright
    (usually hips laterally rotate in-utero)

- **Metatarsus adductus**:  
  - medial deviation of forefoot
  - 90% resolve spontaneously
  - casting if rigid or persists late in 1st year
Rotational Deformities
Common Presentations

Toddlers

• In-toeing most common during second year.  
  (at beginning of walking)

• Causes:
  – medial tibial torsion.
  – metatarsus adductus.
  – abducted great toe.
Rotational Deformities
Common Presentations

Toddlers - Medial Tibial Torsion

- The commonest cause of in-toeing
- Observational management is best
- Avoid special shoes / splints / braces
  - unnecessary, ineffective, interferes with activity and cause psychological and behavioral problems.
Rotational Deformities
Common Presentations

Toddler - Metatarsus Adductus

• Serial casting is effective in this age-group
• Usually correctable by casting up to 4 years
Rotational Deformities
Common Presentations

Toddlers - Abducted Great Toe

- Dynamic deformity
- Over-pull of Abductor Hallucis Muscle during stance phase

- Spontaneously resolve - no treatment
Rotational Deformities
Common Presentations

Child

- **In-toeing**: due to medial femoral torsion
- **Out-toeing**: in late childhood
  lateral femoral / tibial torsion
Rotational Deformities
Common Presentations

Child
Medial Femoral Torsion

• Usually: - starts at 3 - 5 years,
  - peaks at 4 – 6 years,
  - then resolves spontaneously.

• Girls > boys.

• Look at relatives - family history – normal.

• Treatment usually not recommended.

• If persists > 8 years and severe, may need surgery.
Rotational Deformities
Common Presentation

Medial Femoral Torsion (Ante-version)

- Stands with knees medially rotated (kissing patellae).
- Sits in W position.
- Runs awkwardly (egg-beater).

Family History
Rotational Deformities
Common Presentations

Child
Lateral Tibial Torsion

- Usually worsens.
- May be associated with knee pain (patellar) specially if LTT is associated with MFT.
  (knee medially rotated and ankle laterally rotated)
Rotational Deformities
Common Presentations

Child
Medial Tibial Torsion

- Less common than LTT in older child
- May need surgery if:
  - persists > 8 year,
  - and causes functional disability
Rotational Deformities
Management

• Challenge : dealing effectively with family

• In-toeing : spontaneously corrects in vast majority of children as LL externally rotates with growth - Best Wait!
Rotational Deformities
Management

Convince family that only observation is appropriate.

- < 1% of femoral & tibial torsional deformities fail to resolve and may require surgery in late childhood.
Rotational Deformities Management

- Attempts to control child’s walking, sitting and sleeping positions is impossible and ineffective cause frustration and conflicts.

- She wedges and inserts: ineffective.
- Bracing with twistes :ineffective - and limits activity.
Rotational Deformities Management

Shoe wedges Ineffective

Twister cables Ineffective
Rotational Deformities
When To Refer?

- Severe & persistent deformity.
- Age > 8-10y.
- Causing a functional disability.
- Progressive.
Rotational Deformities Management

When Is Surgery Indicated?

• In older child ( > 8 – 10 years ).

• Significant functional disability.

• Not prophylactic !
Leg Aches / Growing Pains
Leg Aches / Growing Pains

- Incidence: 15-30% of children.
- More in girls / At night / In LL.
- Diagnosis is made by exclusion.
Leg Aches / Growing Pains

History

- Vague pain.
- Poorly localised.
- Bilateral.
- Nocturnal.
- Seldom alters activity.
- Long duration.
Leg Aches / Growing Pains
Examination

- General health is normal.
- No deformities.
- No joint stiffness.
- No tenderness.
- Normal gait.
- No limping.
Leg Aches / Growing Pains Management

• When atypical history or signs present on examination:
  – Imaging and lab. Studies.

• If all negative:
  – Symptomatic treatment:
    • Heat / Analgesics.
  – Reassure family:
    • Benign.
    • Self-limiting.
    • Advise to re-evaluate if clinical features change.
## Leg Aches / Growing Pains

<table>
<thead>
<tr>
<th>Feature</th>
<th>Growing Pain</th>
<th>Serious Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long duration</td>
<td>Often</td>
<td>Usually not</td>
</tr>
<tr>
<td>Pain localised</td>
<td>No</td>
<td>Often</td>
</tr>
<tr>
<td>Pain bilateral</td>
<td>Often</td>
<td>Unusual</td>
</tr>
<tr>
<td>Ulterior activity</td>
<td>No</td>
<td>Often</td>
</tr>
<tr>
<td>Cause limping</td>
<td>No</td>
<td>Sometimes</td>
</tr>
<tr>
<td>General health</td>
<td>Good</td>
<td>May be ill</td>
</tr>
</tbody>
</table>

From Stahili: Practice of Pediatric Orthopedics 2001
# Leg Aches / Growing Pains

<table>
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<tr>
<th>Feature</th>
<th>Growing Pain</th>
<th>Serious Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical examination:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenderness</td>
<td>No</td>
<td>May show</td>
</tr>
<tr>
<td>Guarding</td>
<td>No</td>
<td>May show</td>
</tr>
<tr>
<td>Reduced rang of motion</td>
<td>No</td>
<td>May show</td>
</tr>
<tr>
<td><strong>Laboratory:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBC</td>
<td>Normal</td>
<td>? Abnormal</td>
</tr>
<tr>
<td>ESR</td>
<td>Normal</td>
<td>? Abnormal</td>
</tr>
</tbody>
</table>

From Stahili: Practice of Pediatric Orthopedics 2001
CDH / DDH

Congenital Dislocation of Hip.
Developmental Dysplasia of Hip.
CDH Spectrum

- **Teratologic Hip**: Fixed dislocation
  Often with other anomalies
- **Dislocated Hip**: Completely out
  May or may not be reducible
- **Subluxated Hip**: Only partially in
- **Unstable Hip**: Femoral head can be dislocated
- **Acetabular Dysplasia**: Shallow Acetabulum
  Head Subluxated or in place
CDH
Etiology & Risk Factors

• Prenatal:
  – Positive family history (increases risk 10X)
  – Primi-gravida
  – Female (4-6 X > Males)
  – Oligo-hydramnious
  – Breech position (increases risk 5-10 X)

• Postnatal:
  – Swaddling / Strapping ( ? Knees extended)
  – Ligament Laxity
  – Torticollis (CDH in 10-20 % cases)
  – Cong. Knee recurvatum / dislocation
  – Metatarsus adductus / calcaneo-valgus
CDH
Risk Factors

When Risk Factors Are Present

- The infant should be examined *repeatedly*
- The hip should be imaged by
  - U/S
  - or X-ray
CDH
Clinical Examination
CDH
Neonatal Examination

LOOK:
• Asymmetric thigh folds
  – Posterior
  – anterior
CDH
Clinical Examination

Look:

• Shortening (not in neonates)
  - in supine
  - Galeazzy sign
CDH
Neonatal Examination

MOVE:
• Hip instability in early infancy
• Limited hip abduction in flexion - later
• (careful in bilateral)
  if <60° on both sides:
  request imaging
CDH
Neonatal Examination
CDH
Neonatal Examination
Hip Flexion Deformity

SPECIAL:
• Loss of fixed flexion deformity of hips in early infancy.
• Normally FFD:
  – newborn  28°
  – at 6 weeks  19°
  – at 6 months  7°

Thomas Test
CDH
Neonatal Examination

Ortolani
Feel Clunk
Not hear click!

Barlow
CDH
Neonatal Examination
Ortolani / Barlow
CDH
Neonatal Examination

Ortolani Test

Barlow Test
CDH
Clinical Examination

• **Hip clicks**:  
  - fine, short duration, high pitched sounds  
  - common and benign – from soft tissues

• **Hip clunks**:  
  - sensation of the hip displacing over the acetabular margin

• **If in doubt**:  
  - U/S in young infants  
  - single radiograph if > 2-3 months
CDH
Clinical Examination

• Neonate (up to 2-3 months):
  – Instability/ Ortolani-Barlow

• Infant ( > 2-3 months):
  – Limited abduction
  – Shortening (Galeazzi)

• Toddler:
  – Limited abduction
  – Shortening (Galeazzi)

• Walker:
  – Trendelenburgh limpimg
CDH
Ultrasound Screening

- Early U/S screening not recommended
- Delayed U/S screening:
  - Older than 3 weeks
  - Those at risk or suspicious by:
    - History
    - Clinical exam
CDH
Treatment

• Birth to 6 months:
  – Pavlik harness or hip spica cast

• 6 months – 12 months:
  – closed reduction UGA and hip spica casts

• 12 months – 18 months:
  – possible closed / possible open reduction

• Above 18 months:
  – open reduction and ? Acetabuloplasty

• Above 2 years:
  – open reduction, acetabuloplasty, and femoral osteotomy
CDH
Treatment

• Method depends on Age
• The earlier started, the easier the treatment & the better the results
• Should be detected EARLY
• UREGENT referral once an abnormality is detected.
Anatomy/Terminology

• 3 main sections

1. Hindfoot – talus, calcaneus
2. Midfoot – navicular, cuboid, cuneiforms
3. Forefoot – metatarsals and phalanges
Anatomy/Terminology

• Important joints
  1. tibiotalar (ankle) – plantar/dorsiflexion
  2. talocalcaneal (subtalar) – inversion/eversion

• Important tendons
  1. achilles (post calcaneus) – plantar flexion
  2. post fibular (navicular/cuneiform) – inversion
  3. ant fibular (med cuneiform/1\textsuperscript{st} met) – dorsiflexion
  4. peroneus brevis (5\textsuperscript{th} met) - eversion
Anatomy/Terminology

- Varus/Valgus
Calcaneovalgus foot
Calcaneovalgus foot

• ankle joint dorsiflexed, subtalar joint everted
• classic positional deformity
• more common in 1st born, LGA, twins
• 2-10% assoc b/w foot deformity and DDH
• treatment requires stretching: plantarflex and invert foot
• excellent prognosis
Congenital Vertical Talus

- true congenital deformity
- 60% assoc w/ some neuro impairment
- plantarflexed ankle, everted subtalar joint, stiff
- requires surgical correction (casting is generally ineffective)
Talipes Equinovarus (congenital clubfoot)

A. General
  - complicated, multifactorial deformity of primarily genetic origin
  
  - 3 basic components
    (i) ankle joint plantarflexed/equines
    (ii) subtalar joint inverted/varus
    (iii) forefoot adducted
Talipes Equinovarus (congenital clubfoot)
Talipes Equinovarvarus (congenital clubfoot)

B. Incidence
- approx 1/1,000 live births
- usually sporadic
- bilateral deformities occur 50%

C. Etiology
- unknown
- defect in development of talus leads to soft tissue changes in joints, or vice versa
Talipes Equinovarus (congenital clubfoot)

D. Diagnosis/Evaluation
- distinguish mild/severe forms from other disease
- AP/Lat standing or AP/stress dorsiflex lat films

E. Treatment
• Non-surgical
  - weekly serial manipulation and casting
  - must follow certain order of correction
  - success rate 15-80%
• Surgical
  - majority do well; calf and foot is smaller
Talipes Equinovarus (congenital clubfoot)
Pes Planus (flatfoot)

A. General
- refers to loss of normal medial long. arch
- usually caused by subtalar joint assuming an everted position while weight bearing
- generally common in neonates/toddlers

B. Evaluation
- painful?
- flexible? (hindfoot should invert/dorsiflex approx 10 degrees above neutral
- arch develop with non-weight bearing pos?
Pes Planus (flatfoot)
Pes Planus (flatfoot)

C. Treatment

(i) Flexible/Asymptomatic
- no further work up/treatment is necessary!
- no studies show flex flatfoot has increased risk for pain as an adult

(ii) rigid/painful
- must r/o tarsal coalition – congenital fusion or failure of seg. b/w 2 or more tarsal bones
- usually assoc with peroneal muscle spasm
- need AP/lat weight bearing films of foot
In-Toeing

A. General
- common finding in newborns and children
- little evidence to show benefit from treatment
In-Toeing

B. Evaluation
- family hx of rotational deformity?
- pain?
- height/weight normal?
- limited hip abduct or leg length discrepancy?
- neuro exam

C. 3 main causes
(i) metatarsus adductus
(ii) internal tibial torsion
(iii) excessive femoral anteversion
In-Toeing

(i) metatarsus adductus
- General

• normal hindfoot, medially deviated midfoot

• diagnosis made if lateral aspect of foot has “C” shape, rather than straight
In-Toeing

(i) metatarsus adductus

- Evaluation

• should have normal ankle motion
• assess flexibility by holding heel in neutral position, abducting forefoot
In-Toeing

(i) metatarsus adductus

• treatment
  - if flexible, stretching; Q diaper change, 10 sec
  - if rigid, or if no resolution by 4-8 months, refer to ortho
  - prognosis is good: 85-90% resolve by 1yr
In-Toeing

(ii) Internal Tibial Torsion

• usually presents by walking age

• knee points forward, while feet point inward
In-Toeing

(ii) Internal Tibial Torsion

- Treatment
  - reassurance! spontaneous resolution in 95% children, usually by 7-8yrs
  - controversy with splints, casts, surgery
In-Toeing

(iii) Excessive Femoral Anteversion

- both knees and feet point inward
- presents during early childhood (3-7yrs)
- most common cause of in-toeing
In-Toeing

(iii) Excessive Femoral Anteversion

- int rotation 70-80 deg
- ext rotation 10-30 deg
- “W” position
In-Toeing

(iii) Excessive Femoral Anteversion

- increase in internal rotation early with gradual decrease
In-Toeing

(iii) Excessive Femoral Anteversion

- Treatment
  - no effective non-surgical treatment
  - surgical intervention usually indicated if persists after 8-10 yrs and is cosmetically unacceptable or functional gait problems
  - derotational osteotomy
References

• Canale. Campbell’s Operative Orthopedics, 9th ed. 1998 1713-1735; 938-940
CLUB FOOT

Gross deformity of the foot that is giving it the stunted lumpy appearance.
CLUB FOOT

Definitions

Talipes:  Talus = ankle
         Pes    = foot

Equinus: (Latin = horse)
        Foot that is in a position of
        planter flexion at the ankle,
        looks like that of the horse.

Calcaneus: Full dorsiflexion at the ankle
CLUB FOOT

Planus: flatfoot

Cavus: highly arched foot

Varus: heel going towards the midline

Valgus: heel going away from the midline

Adduction: forefoot going towards the midline

Abduction: forefoot going away from the midline
CLUB FOOT

Types

Postural:
- Calcaneo-Valgus
- Equino-Varus

Look for CDH

Minor and correctable
CLUB FOOT

Types

*Idiopathic (Unknown Etiology)*:
- Congenital Talipes Equino-Varus *CTEV*

*Acquired, Secondary to*:
- CNS Disease: Spina bifida, Poliomyelitis
- Arthrogryposis
- Absent Bone: fibula / tibia
Congenital clubfoot or CTEV occurs typically in an otherwise normal child.
Congenital Talipes Equino-Varus
CTEV

Etiology

- Polygenic
- Multifactorial

although many of these factors are speculative
Congenital Talipes Equino-Varus CTEV

Etiology

Some of these factors are:

• Abnormal intrauterine forces
• Arrested fetal development
• Abnormal muscle and tendon insertions
• Abnormal rotation of the talus in the mortise
• Germ plasm defects
Congenital Talipes Equino-Varus (CTEV)

Incidence

- Occurs approximately in one of every 1000 live birth
- In affected families, clubfeet are about 30 times more frequent in offspring
- Male are affected in about 65% of cases
- Bilateral cases are as high as 30 – 40%
Congenital Talipes Equino-Varus
CTEV

Geographic Distribution

- Middle East, KSA common
- Mediterranean Coast & North Africa
- White race
Congenital Talipes Equino-Varus
CTEV

Basic Pathology

• Abnormal Tarsal Relation
  Congenital Dislocation / Subluxation
  Talo Calcaneo Navicular Joint
• Soft Tissue Contracture
  Congenital Atresia

EGG & CHICKEN
Congenital Talipes Equino-Varus (CTEV)
Congenital Talipes Equino-Varus
CTEV

Adaptive Changes

Wolff’s Law
“Every change in the use of static function of bone caused a change in the internal form or architecture as well as alteration in its external formation and function according to mechanical law”

Davis Law
“When ligaments and soft tissue are in loose or lax state; they gradually shorten”
Congenital Talipes Equino-Varus (CTEV)

Adaptive Changes

- **Bony:**
  Change in the shape of tarsal and metatarsal bones especially after walking

- **Soft Tissue:**
  Shortening ? Contracture in the Concave Side
  1- Muscles
  2- Tendons
  3- Ligaments
  4- Joints Capsule
  5- Skin
  6- Nerves & Vessels
Congenital Talipes Equino-Varus
CTEV
**Congenital Talipes Equino-Varus (CTEV) Diagnosis**

**General 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”
Congenital Talipes Equino-Varus
CTEV
Diagnosis

Spina Bifida = Paralytic TEV
Congenital Talipes Equino-Varus
CTEV

Diagnosis

Characteristic Deformity:

Hind foot

• Equinus       (Ankle joint)
• Varus         (Subtalar joint)

Fore foot

• Adduction     (Med tarsal joint)
• Supination fore foot
• Cavus
Congenital Talipes Equino-Varus
CTEV
Diagnosis
Congenital Talipes Equino-Varus (CTEV)

**Diagnosis**

“Hind foot“  
Equinus, Varus

“Fore foot“  
Adduction, Supination, Cavus
Congenital Talipes Equino-Varus
CTEV

Diagnosis

NORMAL  MILD  MODERATE  SEVERE

Metatarsus Adductus
Congenital Talipes Equino-Varus (CTEV)

Diagnosis

• 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
Congenital Talipes Equino-Varus
CTEV
Diagnosis
Congenital Talipes Equino-Varus (CTEV)

**Diagnosis**

*X-Ray* needed to assess progress of treatment
Congenital Talipes Equino-Varus
CTEV

Treatment

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.
Congenital Talipes Equino-Varus (CTEV)

Treatment

Non-surgical treatment should begin shortly after birth.

1. Gentle manipulation

2. Immobilization
   - Strapping ???
   - POP or synthetic cast
Congenital Talipes Equino-Varus CTEV

Treatment

Non Surgical treatment should begin shortly after birth

3. Splints to maintain correction
   - Ankle-foot orthosis ????
   - Dennis Brown splint
Congenital Talipes Equino-Varus (CTEV)

Treatment

Manipulation and serial casts

- Validity, up to 6 months!
- Technique “Ponseti”
- Avoid false correction
- When to stop?
- Maintaining the correction
- Follow up to watch and avoid recurrence
Congenital Talipes Equino-Varus

CTEV

Treatment

Ponseti technique

1. Always use long leg casts, change weekly.
2. First manipulation raises the 1st metatarsal to decrease the cavus
3. All subsequent manipulations include pure abduction of forefoot with counter-pressure on neck of talus.
4. Never pronate!
5. Never put counter pressure on calcaneus or cuboid.
6. Cast until there is about 60 degrees of external rotation (about 4-6 casts)
7. Percutaneous tendo Achilles tenotomy in cast room under local anesthesia, followed by final cast (3 weeks)
8. After final cast removal, apply Normal last shoes with Denis Browne bar set at 70 degrees external rotation (40 degrees on normal side)
9. Denis Browne splint full time for two months, then night time only for two-four years.
10. 35% need Anterior Tibialis tendon transfer at age 2-3
Congenital Talipes Equino-Varus (CTEV)

Surgical Treatment

Indications
- Late presentation, after 6 months of age!
- Complementary to conservative treatment
- Failure of conservative treatment
- Residual deformities after conservative treatment
- Recurrence after conservative treatment
Congenital Talipes Equino-Varus
CTEV

Surgical Treatment

- Types (soft tissue and bony operations)
- Time of surgery
- Selection of the procedure and the incision
- Post operative care
- Follow up
- Complications
Congenital Talipes Equino-Varus (CTEV)

Surgical Treatment

**Soft tissue operations**

1. Release of contractures
2. Tenotomy
3. Tendon elongation
4. Tendon transfer
5. Restoration of normal bony relationship
Congenital Talipes Equino-Varus (CTEV)

Surgical Treatment
Congenital Talipes Equino-Varus (CTEV)

Surgical Treatment
Congenital Talipes Equino-Varus
CTEV
Surgical Treatment

Bony operations

- Indications
- Usually accompanied with soft tissue operation
- Types:
  - Osteotomy, to correct foot deformity or int. tibial torsion
  - Wedge excision
  - Arthrodesis (usually after bone maturity)
    - one or several joints
  - Salvage operation to restore shape
Congenital Talipes Equino-Varus
CTEV
Surgical Treatment
Congenital Talipes Equino-Varus
CTEV
Surgical Treatment
Congenital Talipes Equino-Varus (CTEV)

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