



5º Curso Internacional de Reconstrução Osteo-Articular
5th International Course of Osteo-Articular Reconstruction



Congenital Femur Deficiency and Fibular Hemimelia – Amputation and Prothetisation

Maria José Costa, Francisco Tavares
Physical Medicine and Rehabilitation
Hospital de Dona Estefânia
Lisboa – Portugal

Pediatric Amputations

- About 70% of pediatric amputee are congenital limb deficiencies:
 - Fibular Hemimelia (1 / 40.000) (1)
 - Congenital Femur Deficiency (1 / 50.000 – 200.000) (2)
- 40% of the children with congenital limb deficiencies will have multiple limb involvement (3)

(1) Limb Reconstruction Surgery for Fibular Hemimelia; Dror Paley

(2) Oppenheim WL, Setoguchi Y, Fowler E. Overview and comparison of Syme's amputation and knee fusion with the van Nes rotationplasty procedure in proximal femoral focal deficiency. In: Herring JA, Birch J, eds. *The Child With a Limb Deficiency. Chicago, Ill.: American Academy of Orthopaedic Surgeons;1998.*

(3) Gibson DA. Child and juvenile amputee. In: Banjerjee SN, ed. *Rehabilitation management of amputees.* Baltimore/London: Williams & Wilkins, 1982

Pediatric Amputations

ISPO classification

- Transverse Deficiencies
 - Easy decision prothetisation
- Longitudinal Deficiencies
 - Complex problem
 - Multiple therapeutic options
 - Lower limb most frequent:
 - Fibular Hemimelia
 - Congenital Femur Deficiency



Fibular Hemimelia

- Associated with other deformities:
 - foot ray deficiency
 - sub-talar coalition
 - ball and socket ankle joint
 - ankle joint malorientation
 - diaphyseal angular deformity apex anteromedial
 - fibular deficiency
 - congenital shortening of the tibia
 - femoral malformation (coxa vara, CFD, lateral femoral condylo hypoplastic,...)

Fibular Hemimelia

- Clinical presentation:
 - Shorter limb (below knee)
 - **Frequently** with foot deformity
 - **Possible** ankle and knee instability



Congenital Femur Deficiency

- Spectrum of severity of femoral deficiency and deformity:
 - Lack of integrity, stability and mobility of hip and knee joints
 - Bone malorientation, bone malrotation
 - Soft tissue contractures of the hip and knee

Congenital Femur Deficiency

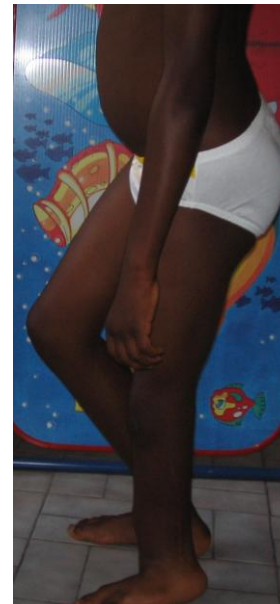
Clinical Presentation:

- Shorter lower limb (above knee)
- Knee apparently inexistent or in proximal position
- Usually normal foot



CFD and FH – What they have in common?

- Abnormal stand position and gait
 - Dismetry
 - Deformity

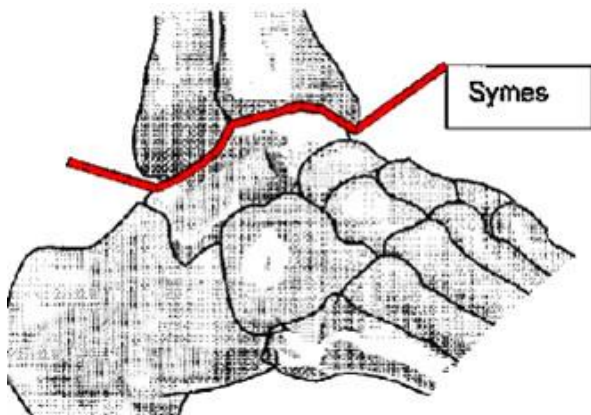


Pediatric Amputation

- Primary goal: maximize function
- Approach based on:
 - Preservation limb length and growth plates
 - Disarticulation
 - Proximal portion stabilization/normalization

Level of Amputation – FH

- In Fibular Hemimelia:
 - Incapacity to have a plantigrad foot
 - Unstable ankle
- Syme's amputation

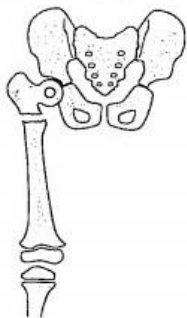


Elective Surgery for CFD

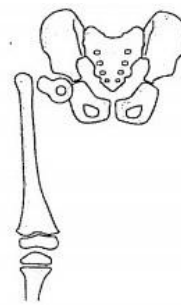
- Varies according to Paley's classification



Type 1a



Type 1b



Type 2a



Type 2b



Type 3a



Type 3b



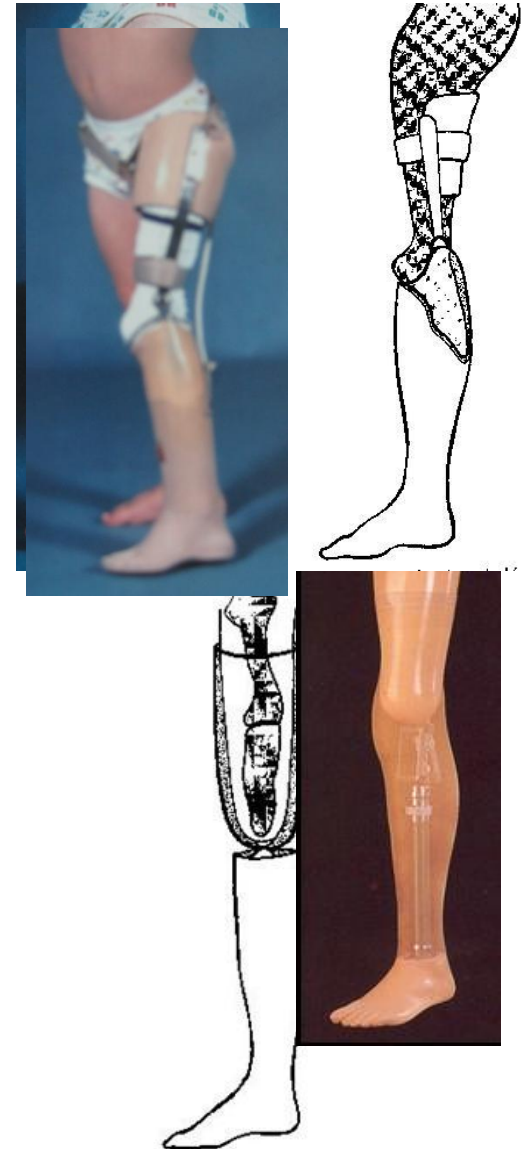
Type 3c



Type 4

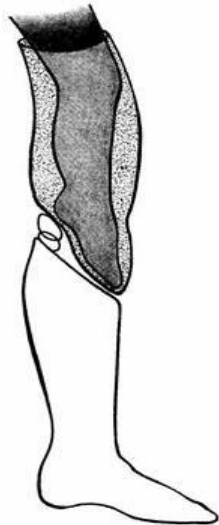
Elective Surgery for CFD

- Rotationplasty
- Syme's amputation
 - With or without knee fusion

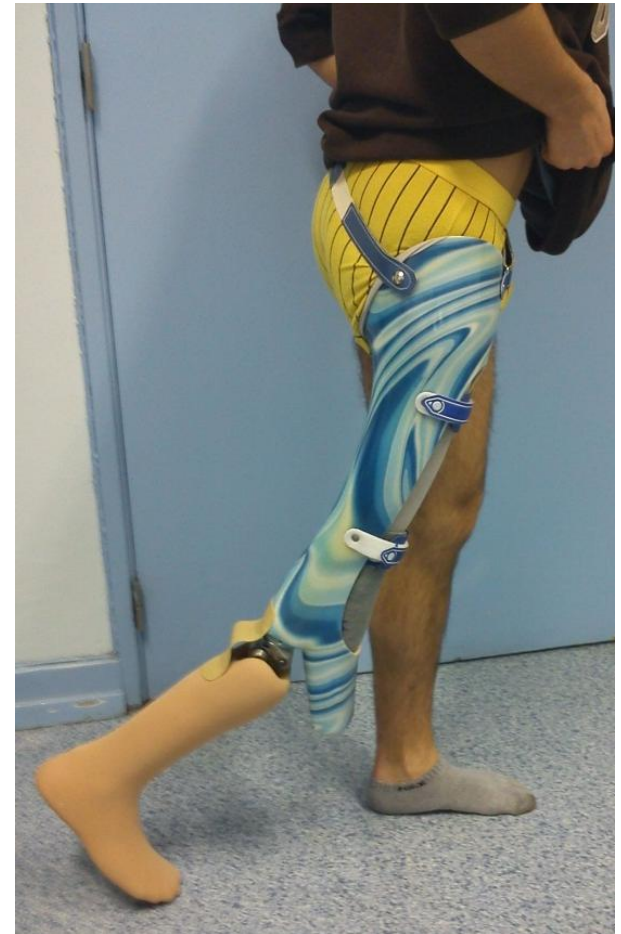


CFD Prothetisation

- Some patients refuse surgical treatment
 - Requiring non-standard prosthesis

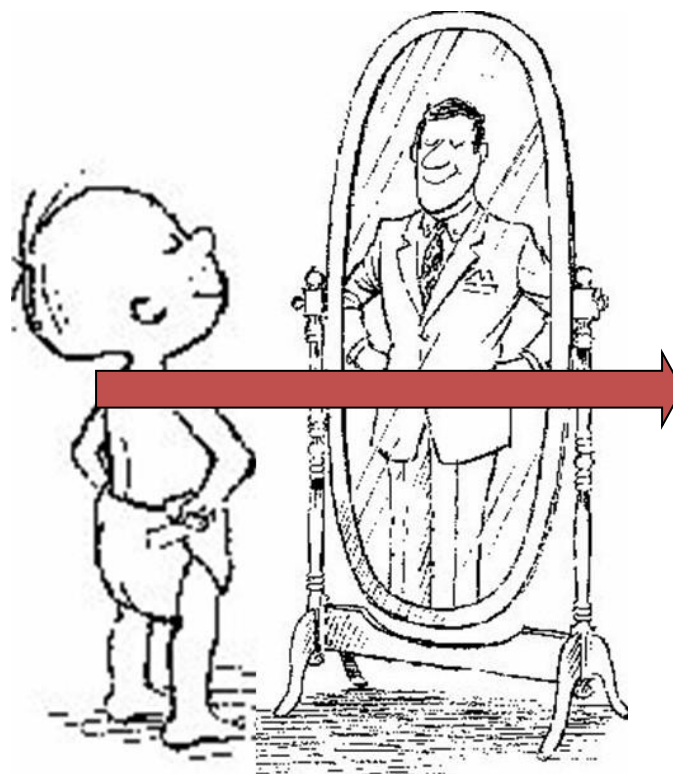


Adaptado de Tachdjian, 1 ed



Differences between children's and adults amputations

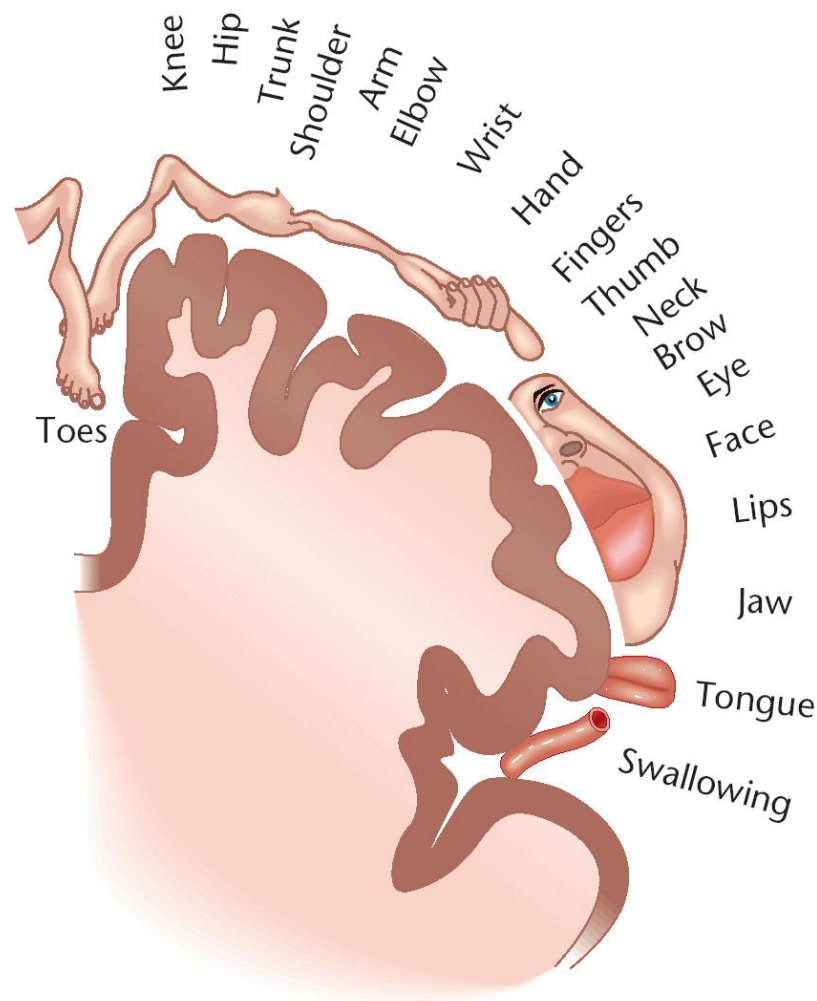
- No sense of loss



Prosthesis:
Assistive
device

When to amputate?

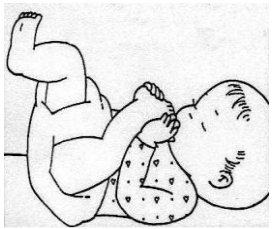
- Before 2 years old
 - before the foot has become fully incorporated into the child's body image



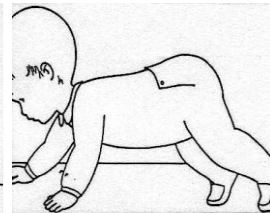
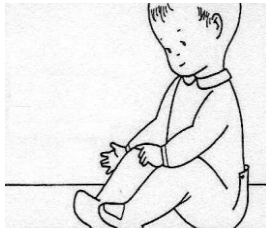
Prosthesis Fitting

- Between 6-12 months
 - Standing
 - Gait

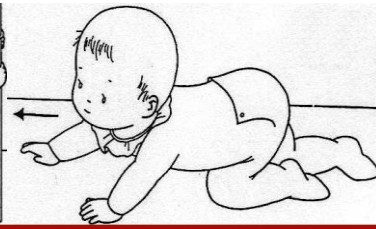
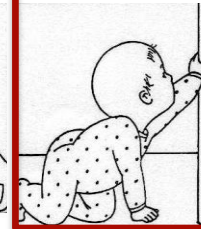
7 M



8M



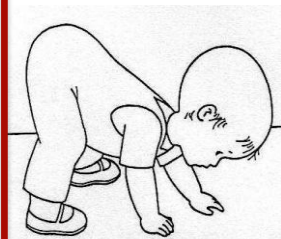
9M



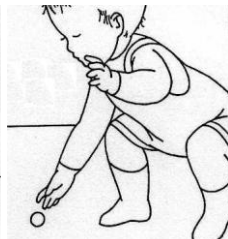
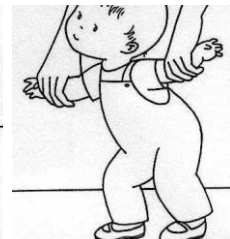
10M



11M



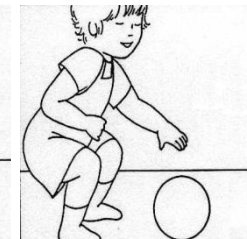
12M



15M



18M



3A



Therapeutic training



Adequate psychomotor development



Energy Expenditure

- Through or below the knee amputation:
 - maintain a normal walking speed
 - without significantly increasing their energy
- Above the knee amputation:
 - significantly slower walk (72-80%)
 - elevated heart rate (124%) and energy cost (VO₂ 151%-161%)
- Bilateral BK amputation:
 - Slower velocity (87%)
 - Elevated heart rate (119%); similar energy cost



Follow-up

- Follow-up
 - 3-4 months intervals
 - Specially during growth spurts until maturity
- New lower limb prosthesis

Literature

< 5 years	→	Anually
5 to 12 years	→	Every other year
13–21 years	→	Once every 3 years

Our experience – HDE

<16 years	→	Anually
>16 years	→	Every other year

Prosthesis Selection

- Age
 - Toddler:
 - Wide based, hip flexion and abduction, knee flexion, total foot initial contact
 - Prosthesis *without* knee component
- Function
 - Varies according to psychomotor development, personality and sports preferences



Prosthesis Components

Suspension and Sockets:



Knees:

- .Monocentric
- .Polycentric
- .Mechanic
- .Pneumatic
- .Hydraulic



Foots:

- SACH
- Dynamic
- Flex Foot junior



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Give children
the prosthesis
that works as hard as they
play