



## Third Course "Gait Analysis and Clinics: a focus on clinical cases"

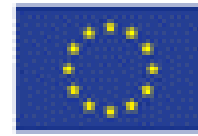
### TRAMA Project

March 10<sup>th</sup> - 14<sup>th</sup> 2008

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Instituto de Rehabilitación Infantil TELETON





# MYELOMENINGOCELE

 Description of the pathology

 Functional clinical scales

 Main treatments

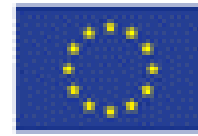
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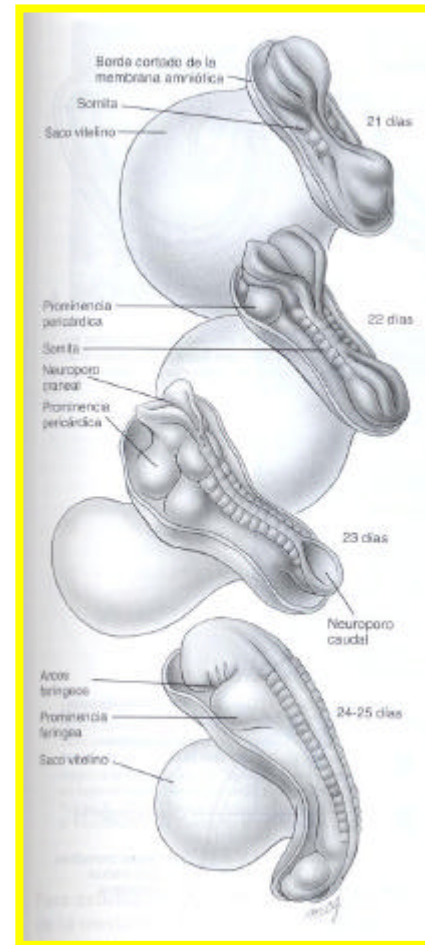
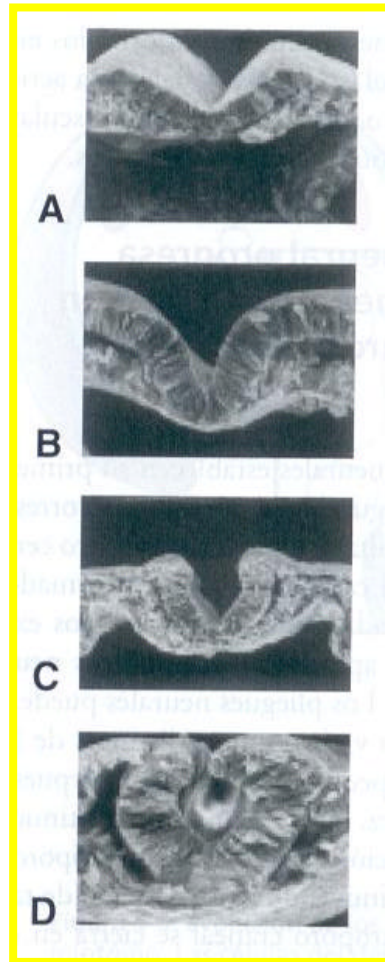
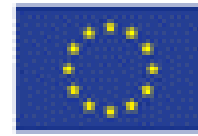
“CONGENITAL DISORDER DUE TO A DEFECT OF NEURAL TUBE CLOSURE DURING THE NEURALATION PHASE OF EMBRYOLOGIC DEVELOPMENT”.

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# EMBRYOLOGIC DEVELOPMENT

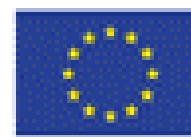


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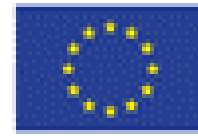


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# ETIOLOGY



## MULTIFACTORIAL:



Genetic Factor



Environmental Factors

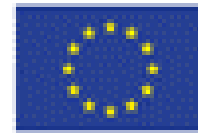
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## II.-DISEASE SYMPTOMS .



### 1.- PRIMARY DISORDERS:

 Paraplegia

 Sensitivity disorders

 Neurogenic bladder

 Neurogenic bowel

 Musculo skeletal disorders

 Renal disorders

 SNC malformations

 Aqueductal hidrocephaly

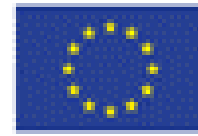
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## II.-DISEASE SYMPTOMS.



### 2.-SECONDARY :


 Urinary tract infection

 Urinary Lithiasis

 Renal Insuficiency

 Faecaloma.

 Incontinency

 Musculoskeletal alterations due to muscular unbalance.

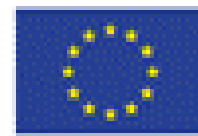
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## II.-DISEASE SYMPTOMS.



### 2.-SECONDARY DISORDERS:

🚩 Hydrocephaly obstructive

🚩 Mental handicap

🚩 Sensorial deficiencies

🚩 Cranial nerves palsy

🚩 Pressure ulcers

🚩 Obesity

🚩 Osteoporosis-fractures

🚩 Seizures

🚩 Functional upper limbs deficiency

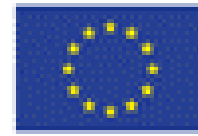
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# III.-MANAGEMENT



## 1.- EARLY

### A.- PRENATAL

### B.- NEONATAL

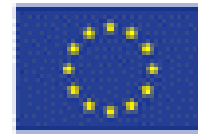
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# III.-MANAGEMENT



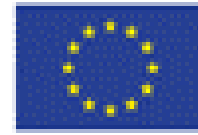
## 2.- LONG TERM

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## III.-MANAGEMENT



### *NEURO SURGICAL COMPLICATIONS*



Tethered cord



Syringomyelia



Hydromyelia



Valvular complications

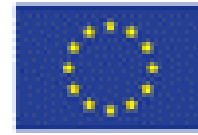
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## III.-MANAGEMENT



### *SKIN COMPLICATIONS*

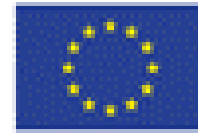
-  Pressure ulcers
-  Poor healing
-  Vascular disorders

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## III.-MANAGEMENT



### *MUSCULOSKELETICAL COMPLICATIONS*

 Due to muscular unbalance

 Congenital

 Arthrogriposis

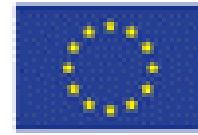
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# III.-MANAGEMENT



## MUSCULOSKELETICAL COMPLICATIONS

### MORE INVOLVED JOINTS



Hips



Knees



Ankle - foot



Spine

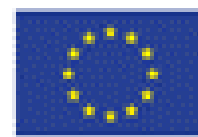
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## III.-MANAGEMENT



### MUSCULO SKELETICAL COMPLICATIONS

#### HIPS

#### MOST FREQUENT PROBLEMS

 Contractures

 Subluxation

 Luxation



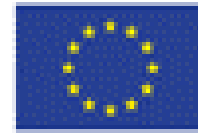
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## III.-MANAGEMENT



### *MUSCULO SKELETAL COMPLICATIONS*

 KNEE

### MOST FREQUENT PROBLEMS

 Flexion contracture

 Genu valgus

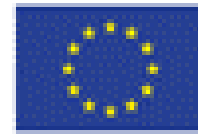
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# III.-MANAGEMENT



## MUSCULO SKELETAL COMPLICATIONS

### FOOT

-  cavus
-  Bot foot
-  varus
-  cavovarus
-  equinus
-  adduct
-  valgus



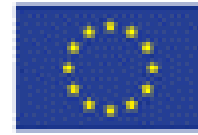
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## III.-MANAGEMENT



### *MUSCULO SKELETAL COMPLICATIONS*

 Motor reeducation – exercises

 Manipulations

 Splints

 Orthoses

 Surgery

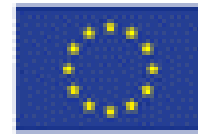
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## III.-MANAGEMENT



### Splints

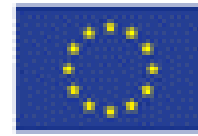


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# III.-MANAGEMENT



## MUSCULO SKELETAL DIFFICULTIES

### SPINE

#### COMMON DEFORMITIES

 Xiphosis

 Scoliosis

 Hyperlordosis



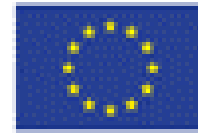
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## III.-MANAGEMENT



### *MUSCULO SKELETAL COMPLICATIONS*

#### SCOLIOSIS



Congenital



Neuromuscular



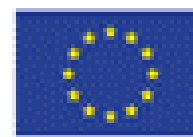
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# SPINAL ORTHOSIS

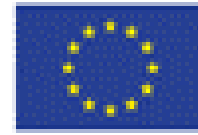


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## III.-MANAGEMENT



### *MUSCULO SKELETAL COMPLICATIONS*

#### Fractures

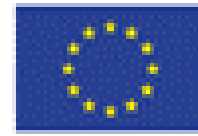
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# III.-MANAGEMENT



## 2.- LONG TERM

### OBESITY

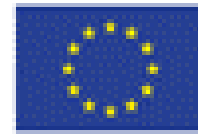
A very common problem favored by the low basal energetic expenditure.

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# III.-MANAGEMENT



## OBESITY

 Early dietetic management

 Exercises and sports.

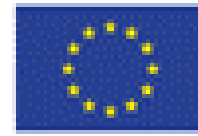
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## III.-MANAGEMENT



### INTELLECTUAL ASPECTS AND PERSONAL DEVELOPMENT

 An increase in the percentage of children with low performance (mental handicap)

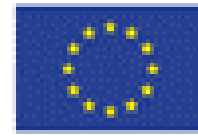
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## III.-MANAGEMENT



### INTELLECTUAL AND PERSONAL DEVELOPMENT ASPECTS

Intellectual performance deteriorated by:

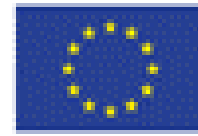
- 🇧🇪 Valvular complications and SNC infections.
- 🇧🇪 Hypoventilation (at night)
- 🇧🇪 Sensory problems
- 🇧🇪 Hydrocephaly normotens (DOC)

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## III.-MANAGEMENT



### INTELLECTUAL ASPECTS AND PERSONAL DEVELOPMENT

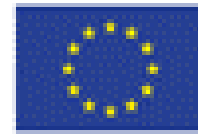
 Cognitive deficits plus motor disabilities  
create difficulties in achieving ADL  
independence

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## III.-MANAGEMENT



### INTELLECTUAL ASPECTS AND PERSONAL DEVELOPMENT

-  Individual educational support
-  Regular Psychometry
-  Adequate strategies to achieve selfcare.
-  Cognitive stimulation programs

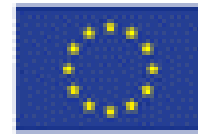
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## III.-MANAGEMENT



### INTELLECTUAL AND PERSONAL DEVELOPMENT ASPECTS

Improving level of self perception and self competence for better social interaction

Adequate family support

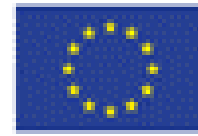
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# III.-MANAGEMENT



## ORTHOSSES

- 🇪🇺 To correct and avoid deformities progression.
- 🇪🇺 Improve function
- 🇪🇺 Protection

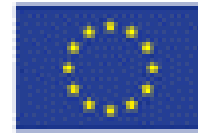


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# III.-MANAGEMENT



## GAIT PROGNOSIS :

-  Motor level
-  Upper limbs function
-  Motivation - cognition
-  Balance
-  Orthopedic deformities
-  Tethered Cord
-  Obesity
-  Age
-  Proprioceptive disorders.

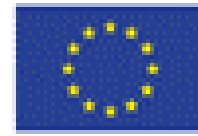
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# MOTOR LEVEL



(IRI TELETON-2007)

🇧🇪 HIGH LEVEL - toracic – upper lumbar (L1-L2)

🇧🇪 LOW LUMBAR ( L3-L4-L5)

🇧🇪 SACRAL LEVEL high and low (S1 a distal)

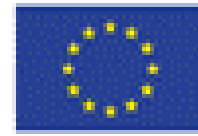
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# HIGH LEVEL



Without quadriceps function



Gait with orthoses HKAFO, RGO or parapodium plus walker or crutches (therapeutic gait)



Physiological and psychological effects of bipedestation and gait.

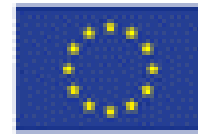
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# HIGH LEVEL



 Most stop walking in adolescence.

 Adults 99% wheel chair mobility

 Obesity is common

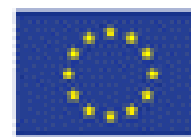
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# HIGH LEVEL

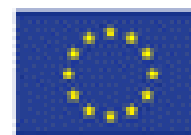


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# HKAFO ORTHOSES

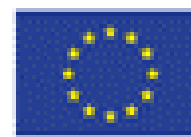


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# RECIPROCAL GAIT ORTHOSIS (RGO)



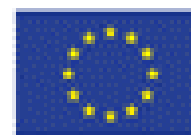
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# STANDING FRAMES



## PARAPODIUM



## PARAWALKER



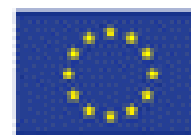
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# STANDING FURNITURE

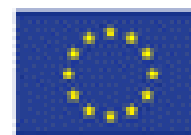


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# STANDING FURNITURE

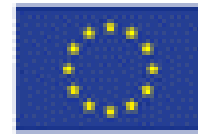


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## LOW LUMBAR LEVEL



- Walk with AFO and crutches
- 80% retain walking ability in adulthood
- Quadriceps powerful
- Gluteus med/maximus < M2 (MRC)

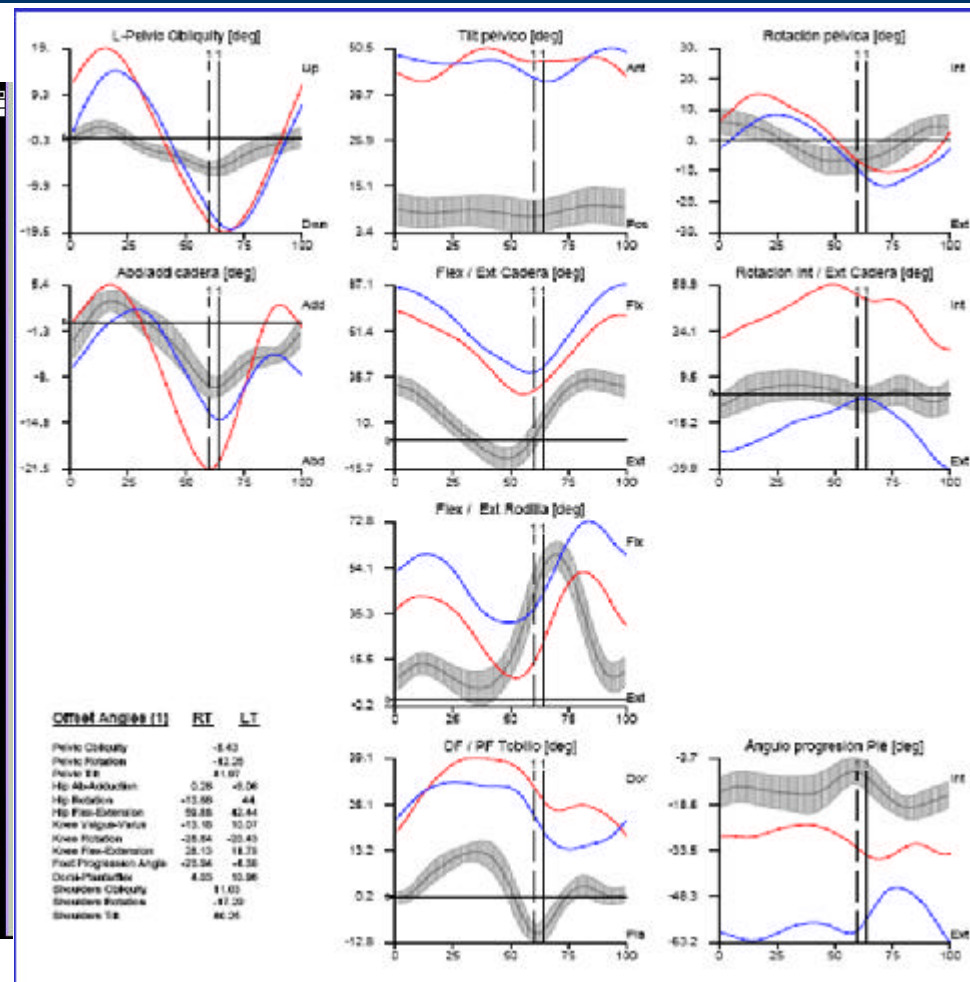
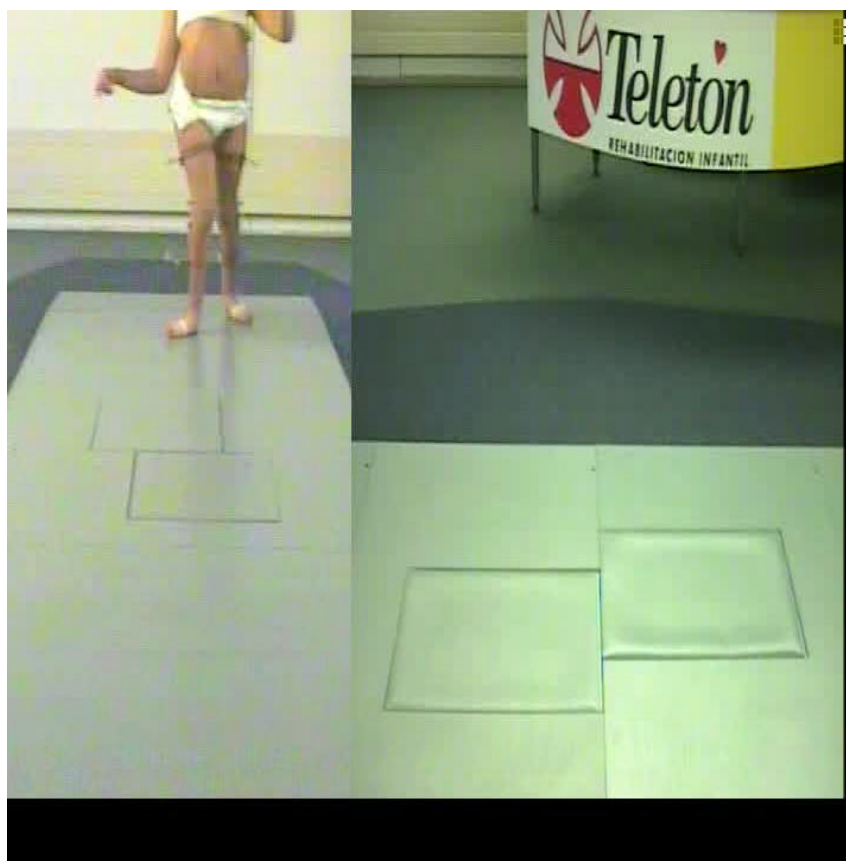
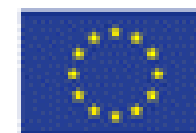
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# LOW LUMBAR - L3



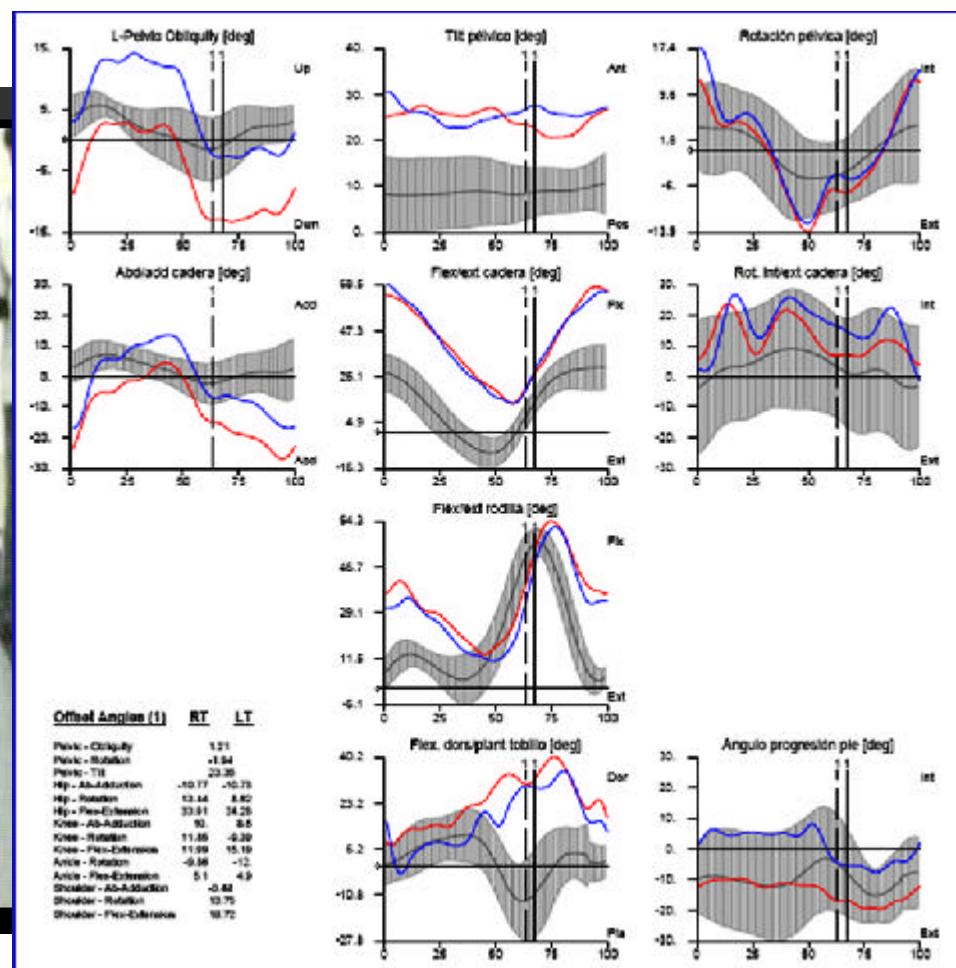
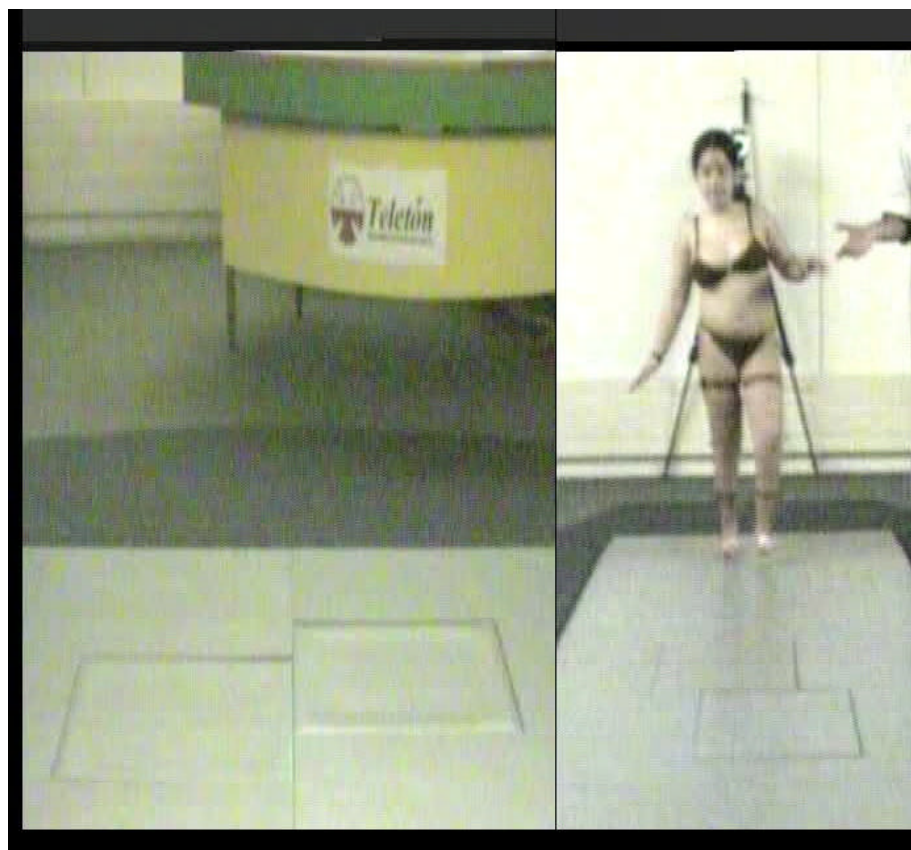
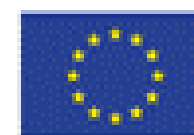
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# LOW LUMBAR L4-L5



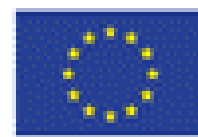
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## SACRAL LEVEL




### UPPER

 Weak gluteus maximum and medius (2 or > MRC)

 Gastrosoleus strength < M3

 Gait with AFOs

### LOW

 Strong gluteus maximum, medius and gastro soleus

 intrinsic foot muscles compromise

 Do not need AFOs, could need SMO

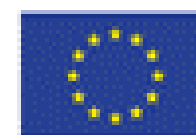
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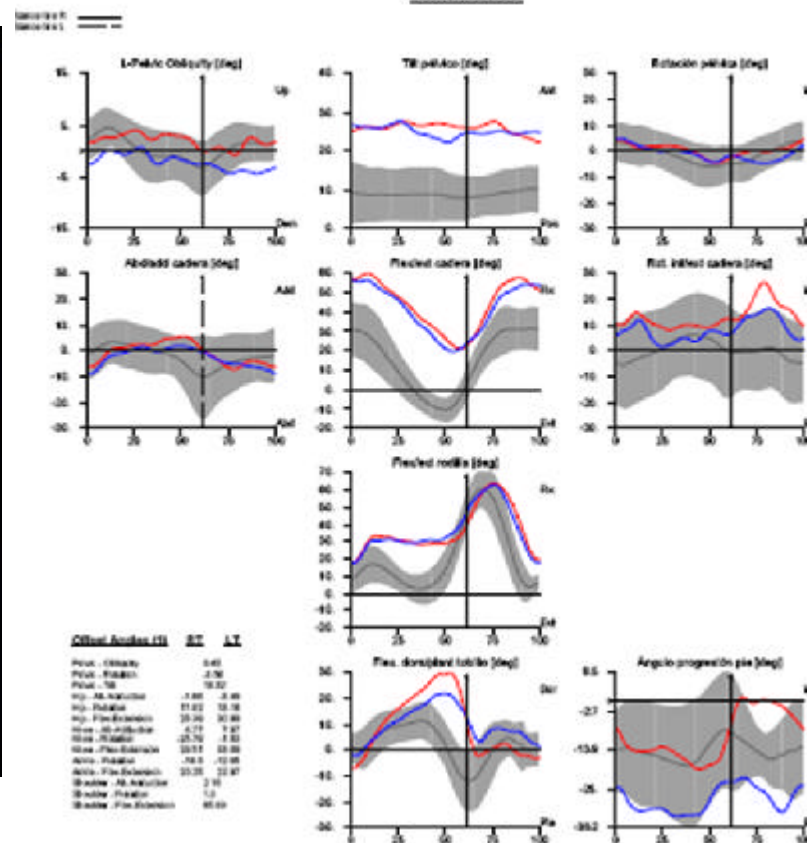
# SACRAL LEVEL



TELETÓN

Patient: ARAYA PASLO  
Date: 09/05/2005  
Test: 1 - Normal walking G  
File Name: 1127a53  
Protocol: Anterior

## Kinemática



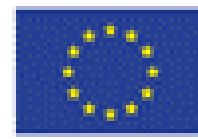
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# FUNCTIONAL CLASSIFICATION OF MYELOMENINGOCELE



IRI Teletón classification

FMS ( Functional Mobility Scale)

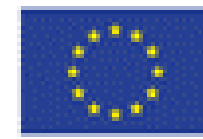
Wee FIM

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# FUNCTIONAL CLASSIFICATION IN MIELOMENINGOCELE



## Functional Mobility Scale (FMS)

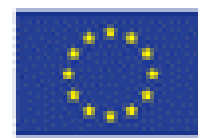
GAIT DISTANCE	PUNTUACION (1 a 6 )
Walk 5 mts (Ej. at home)	
walk 50 mts (Ej. School)	
Walk 500 mts (Ej. Street, shopping )	

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# Functional Mobility Scale (FMS)

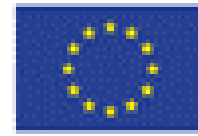


- 1) Use of wheel chair, car, or buggy: can stand for transfers and few steps with assistance of others or using walker.
- 2) Use walker or cart: without help from another person.
- 3) Use two canes: without help from another person.
- 4) Use cane type canadian or two hand stick: without help of another person.
- 5) Independent on flat surfaces: do not use technical aids for walking and not need help from another person. If the patient needs to use furniture, walls, fences as support, use point 4 as an appropriate description.
- 6) Independent in all kind of surfaces: do not use any kind of technical assistance, or assistance of another person to walk, run, climb or go up stairs.

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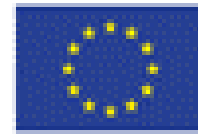
# PROGRAMS ACCORDING DEVELOPMENT OF THE AGE OF THE CHILD

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# UNDER ONE YEAR OLD



 Family handling and instruction of stimulation measures

 Joints hygiene

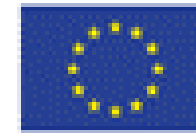
 Postural cares

 Different development stages stimulation

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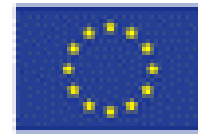


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## UNDER ONE YEAR OLD



-  Serial casting and splinting (thermoplastics)
-  Furniture adaptations
-  Detection of sensory deficits
-  Detection of hip pathology
-  Urological control

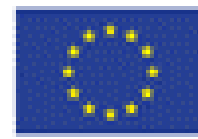
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## BETWEEN THE FIRST AND SECOND YEAR OF LIFE



-  Stimulate social - cognitive development
-  Prevention and management of deformities
-  Start bipedestation with orthoses in adapted furniture.
-  Upper extremities strengthening
-  Self care autonomy according age.
-  X Rays according evolution.

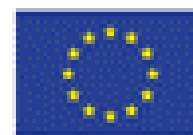
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BETWEEN 2 TO 4 YEARS OLD



 Reinforcing the above

 School Orientation

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## BETWEEN 5 TO 8 YEARS



-  Must achieve independent mobility
-  Emphasis on school guidance.
-  Encourage development of social abilities and thinking
-  Reinforce specific objectives
-  Selfcare

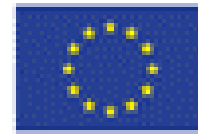
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## BETWEEN 9 AND 15 YEARS OLD




 Growing and development changes follow up

 Avoid gait loss \*

 Reinforce independence in mobility

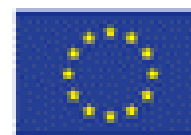
 Vocational guidance

 Follow up (periodic psychometry, school performance, armonic social development).

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