



Final Meeting - TRAMA Project
Bogotá, Colombia



Kinematic upper limb assessment of children with hemiparetic cerebral palsy during a reaching functional task.

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The aims of this work were:

- A. Development of an experimental protocol for functional evaluation of upper limb (3D kinematics)
- B. Evaluation of the upper limb performance through a representative simple movement of a functional task.
- C. Definition and identification of significant parameters for the quantification of the upper limb performance.
- D. Use of this experimental protocol in children with cerebral palsy.

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Experimental group: 23 hemiparetic subjects

12 Right Hemiparesis

11 Left Hemiparesis

N=23

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Hemiparesis **N=23**

	Age	Weight (kg)	Height (cm)
Mean	7.5	29.3	124.5
SD	5.0	19.5	30.5
Max	16.0	65.00	181.0
Min	1.0	9.00	83.0

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Inclusion criteria:



Ambulatory children with a diagnosis of spastic hemiparetic CP
Gross Motor Function Measure (GMFM) II-III
No other neurological disorders
They were able to perform and complete a reaching movement
Able to understand instructions
No report of shoulder or arm pain
Following the usual rehabilitation procedures associated with their condition
Maintaining a stable sitting posture during the experiment
Regular patients that attend to the Children Rehabilitation Center Teleton, State of Mexico (Mexico).

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Experimental instrumentation



6 reflective markers attached on body landmarks:

2 on the wrist (styloid process of ulna)
2 on the elbow (lateral epicondyle)
2 on shoulder (acromion process)

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Upper Limb Protocol



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Experimental instrumentation



Data capture

Optoelectronic capture system of 6 cameras (BTS, Italy)

Spherical markers 15mm diameter

Data processing

Capture: Gait Eliclinic20 (BTS, Italy)

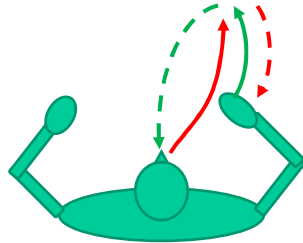
Processed: Smart Analyzer software (BTS, Italy)

Statistics: GraphPad 4.0

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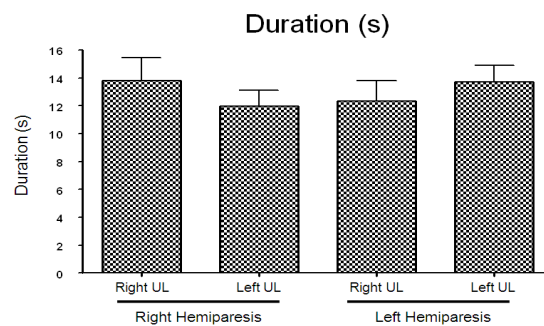
T1 + T2 + T3 + T4 = 1 cycle (100%)



- T1
- - - T2
- T3
- - - T4

Patient seated in front of a table with hands on the table, elbows flexed to 80-90°
(T1) reach a point on the table, in front to 90% of her/his arm length
(T2), from the point on the table to the mouth
(T3) from the mouth to the point on the table
(T4) return to the original position

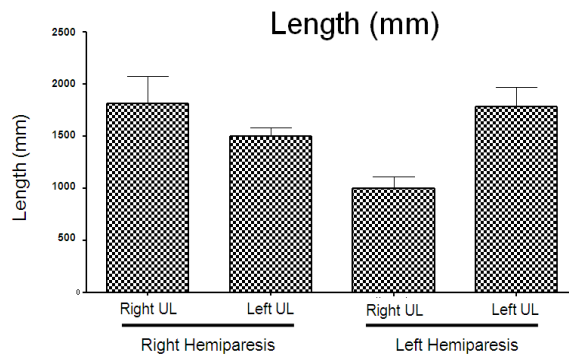
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The duration was longer for the affected upper limb in both pathologies (right side hemiparetic and left hemiparetic).

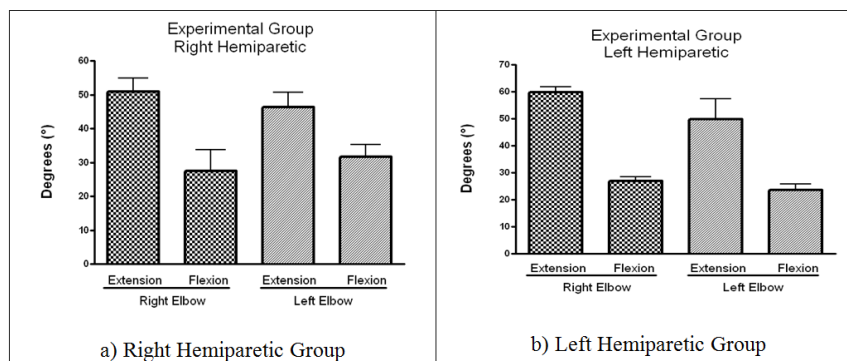
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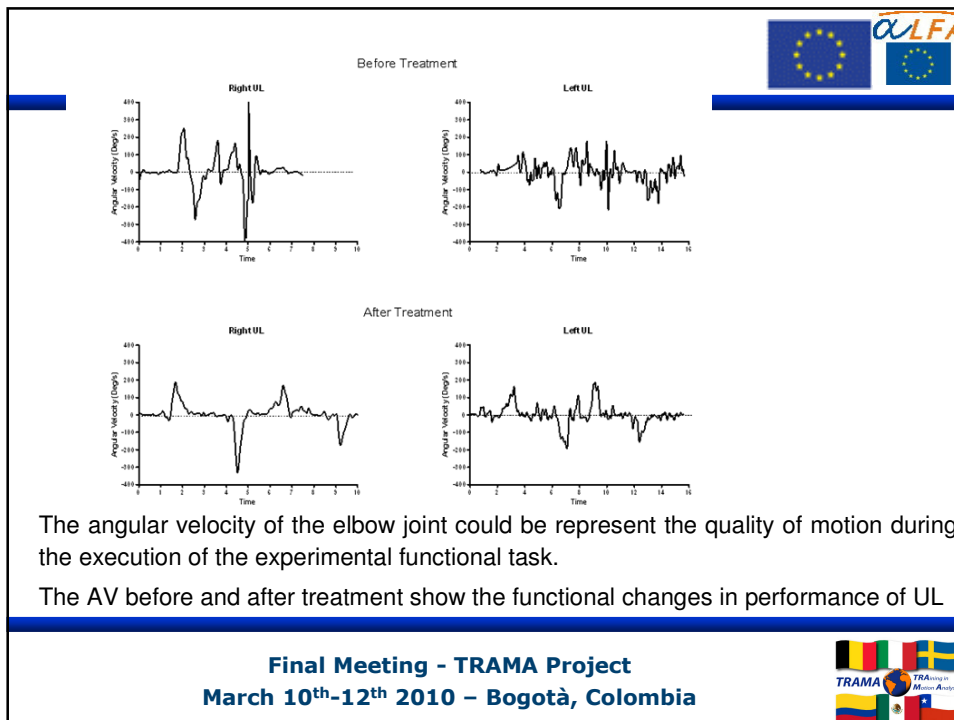


The length of the path of the hand used during the functional task. In both conditions (right hemiparetic and left hemiparetic) the affected upper limb used a longer path to complete the movement.

Flexion-Extension Range



Flexion is lower in the affected limb



Conclusions

This protocol allows the kinematic analysis in reaching performance of UL.

This kind of studies provides a sensitive way to **evaluate treatment and progression and maturation of motor control** .

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Conclusions



Three-dimensional (3D) movement analysis is a powerful tool for a quantitative assessment of movements. It provided an objective description of the upper limb task performance.

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Conclusions



This protocol can be used in **clinical environments to assess the functional status** of patients, performing a functional task, and to measure patient functional outcomes after a process of physical rehabilitation.

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