

VALIDATION OF A SYSTEM TO STUDY THE EFFECTS OF KINESIOTAPING ON THE MOTOR CONTROL OF TIBIALIS ANTERIOR IN A HEMIPARETIC PATIENT.

Sani V^{2,3}, *Piacentini R*³, *Gobbo M*^{1,3}, *Gaffurini P*¹, *Orizio C*^{1,3}, *Bissolotti L*^{2,3}

1. Department of Biomedical and Biotechnology Sciences, Physiology section, University of Brescia
2. Recovery and Functional Rehabilitation Service, Casa di Cura Domus Salutis, Brescia
3. LARIN- Neuromuscular Rehabilitation Laboratory, Casa di Cura Domus Salutis, Brescia
4. Faculty of Exercise and Sport Sciences, University of Verona

INTRODUCTION

Post-stroke hemiparetic syndrome affects the amount of produced muscle force and the patients' ability to perform an intentional motor activity. In particular, two components of motor function are impaired: the precision and the execution speed of the motor task (Lang et al, 2005). The severity of hemiparesis is usually more important in distal muscles than proximal ones (Colebatch and Gandevia, 1989).

GOALS OF STUDY

The present study aimed to propose an objective method to evaluate the motor control of distal lower limb muscles, especially the Tibialis Anterior (TA). Further we attempted to validate the functional application of Kinesio Tex as a tool for neuromotor rehabilitation.

MATERIALS AND METHODS

Subject:

- Female, age 74, affected by a right hemiplegic syndrome

Muscle studied:

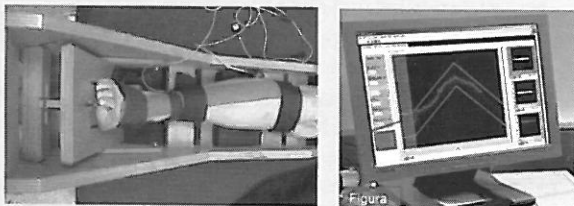
- Tibialis Anterior (TA)

Signals acquired:

- Force and force ripple through load cell

Experimental protocol:

- Applying tape
- 20 m Walking Test – Time up and go Test
- Recording Maximum Voluntary Contraction (MVC)
- Incremental and decremental ramps (on-off) at three levels (10%, 50%, 100% MVC): through visual feedback the subject could check the force exerted and correct it during the execution of the motor task.
- For the patient under rehabilitation treatment two sessions of measurements were carried out: one applying Placebo Tape and one with Kinesio Tape (Fig.1).



Analyzed parameters:

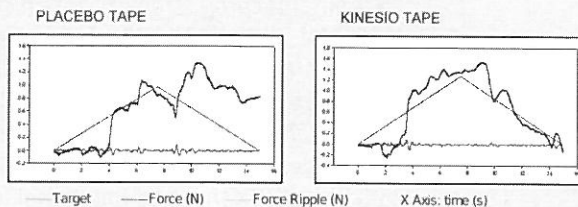
- MCV → average value of 3 seconds maximal contraction
- %Error during performance → $(\text{Force} \cdot 100 / \text{Target}) - 100$
- Speed correction → average frequency of the "ripple"

RESULTS

There is just a slight difference for MVC and Walking Tests durations with or without Kinesiotaping, as shown in the table below.

	20 m	Time Up and Go	MVC
PLACEBO TAPE	40 sec	28 sec	12.8 N
KINESIO TAPE	37 sec	24 sec	9.8 N

In the following pictures we can see force graphs and force ripple signals performed during both tape trials at 10% of MVC.



The average values of %Error and speed correction (Zero Crossing) performed on each ramps of the trials are represented in the next table.

PARAMETER	TAPE	RAMP	on	off	TOTAL	RAMP	on	off	TOTAL	RAMP	on	off	TOTAL
% ERROR	KINESIO	10% of	1552.64	1330.95	2883.59	50% of	6656.07	5884.79	12540.87	100% of	8055.81	4174.22	12230.03
	PLACEBO	10% of	867.72	1936.94	2804.66	50% of	1139.73	3390.15	4529.88	100% of	9738.17	4897.98	14636.15
ZERO CROSSING	KINESIO	MVC	39.5	38.5	78	MVC	22.5	22	44.5	MVC	22.5	14	36.5
	PLACEBO		45	30	75		23	31	54		19	20.5	39.5

At 10% of MVC we detected no changes in motor control with Kinesio Taping applied on the leg.

At 50% motor control worsened the performance.

At 100% of MVC we detected an improvement in motor control of TA.

No differences have been detected in precision and speed correction with or without Kinesio Tape.

CONCLUSIONS

The parameters used in this study allowed us to quantify numerically the motor performance of the TA in terms of magnitude of developed force, precision and speed correction while performing a motor task.

Furthermore, an evaluation about the taping effectiveness on motor control is possible by comparing data.

This method will be used to achieve a better evaluation method in order to improve the knowledge about kinesiotaping technique.

References

- Lang et al. Exp Brain Res 166 (1): 126-136, 2005.
- Colebatch and Gandevia. Brain 112 (3): 749-763, 1989.