

Hand flexors stiffness assessment after stroke with a new electromechanical oscillatory device

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Introduction

Hyper-resistance (HR) to passive stretch is one of the features of muscle overactivity most accessible to clinical assessment, with the MAS and MTS. Validity and reliability of these scales has been questioned. Moreover, they are not able to discriminate between the neural and non neural components of HR.

A wrist Electromechanical oscillatory device (w-EOD) has been developed to provide an objective assessment of HR, distinguishing elastic (EL), viscous (VI) and total (L-path) stiffness (Fig. 1). This device is based on the modellisation of the wrist as a torsion spring and a viscous torsional damper placed in parallel (Fig. 2).



Fig. 1. w-EOD

Methods

V1 → 10 days → V2



T1



T2



T3

Same day, consecutive

Results

Discrimination between affected and less affected hand (Fig. 3)

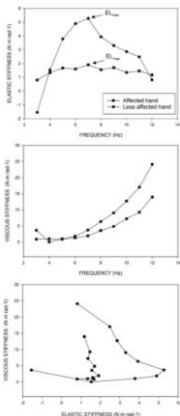


Fig. 3. Typical trace of stiffness of 1 patient

Criterion validity (Table 1)

	MAS	MTS V2	MTS V3
EL_{max} (Nm/rad)	$r = 0.49$	$r = 0.43$	$r = 0.49$

Table 1.

Reliability (ICC) (Fig. 4)

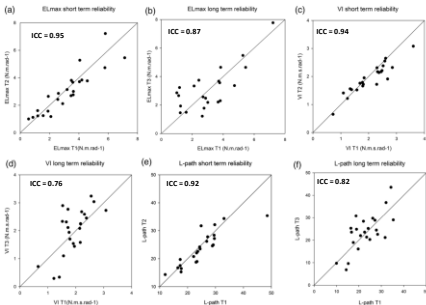


Fig. 4. Intraclass correlation coefficients (ICC)

Conclusion

Stiffness measurements obtained with the w-EOD are valid and reliable to quantify HR in people with stroke and allow to better understand its neural and non neural components. This may help better tailor treatment for patients with HR ('spasticity').



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