CO23-005-e

Analysis of reproducibility of 2D Ultrasound imaging with transient ShearWave Elastography on spastic gastrocnemius medialis muscle in children with spastic hemiplegic cerebral palsy

C. Boulard a,b, L. Mathevon (Dr) a, T. Lapole (Dr) a, V. Gautheron (Prof) b, F. Michel (Dr) a, P. Calmels (Prof) b, B. Parratte (Prof) a

C6 CHU de Saint-Etienne, Saint-Etienne, France
C6 CHU de Besançon, Besançon, France
*Corresponding author.
E-mail address: clement.boulard@laposte.net (C. Boulard)

Purpose  The aim of the study was to assess the intra- and inter-operator reliability of pennation angle (PA) and muscle thickness (MT) 2D measurements and of shear elastic measurement, using ultrasound imaging (US). Those measurements were realised on spastic gastrocnemius medialis muscle at rest and at maximal passive stretching, in children with spastic hemiplegic cerebral palsy. The paretic side measurements were compared to the non- paretic side.

Material and methods  Eight patients took part in 2 inter-session reliability experiments, realised at a 7 days interval by two different operators. The Aixplorer® Supersonic US scanner with the transient ShearWave Elastography (SWE) software was used. The stretching experiments were made manually and controlled by a goniometer.

Results  The intra-operator reliability of the 2D measurements was good. Both operators found a coefficient of variation (CV) ≤ 7% and 6.04% for MT at rest and at maximal passive stretching respectively, ≤ 9.77% for PA at rest. The reliability of the shear elastic modulus measurement in the sagittal plane was only good at rest for both operators with a CV ≤ 9.82%, versus 25.29% at stretching. The inter-operator reliability of 2D measurements was good for MT exclusively (CV ≤ 9.69% for the two sessions and two operators). At rest, MT was weaker in the paretic side (10.17 ± 1.52 mm) versus non-paretic side (12.43 ± 2.85 mm) (P < 0.0001), and the shear elastic modulus was stronger in the paretic side versus non-paretic side (29.45 ± 5.7 Kpa vs 23.77 ± 3.93 Kpa) (P < 0.0001).

Discussion  This is the first description of muscle spastic structure in children with cerebral palsy using SW with Supersonic Shear Imaging. 2D US associated with SWE contribute to assess muscular atrophy and muscle elasticity. These structural properties reflect some of the functional abilities regardless of motor control. It should enable further research on therapies which impact muscle tissue quality, such as botulinum neurotoxin injections, in children with cerebral palsy.

Keywords  2D ultrasound imaging; Transient ShearWave Elastography; Spastic muscle; Structure; Reliability

Disclosure of interest  The authors have not supplied their declaration of conflict of interest.

http://dx.doi.org/10.1016/j.rehab.2015.07.186

CO23-006-e

Impact of spasticity in the development of neurological heterotopic ossifications (NHOs):
Injection of botulinum toxin in a mouse model developing NHOs

M. Salga (Dr) a,b, C. Debaud c, I. Kulina d, C. Vaquette e, J.P. Levesque f, F. Genêt (Dr) a,d

a Université Versailles Saint-Quentin-en-Yvelines, END:ICAP U1179
Inserm, UFR des sciences de la santé Simone-Veil, Montigny-le-Bretonneux, France
b Blood and Bone Diseases Programme, Mater Research Institute, University of Queensland, Woolloongabba, Australia, School of Medicine, University of Queensland, Herston, Australia
c Institute of Health Biomedical Innovation, Queensland University of Technology, Kelvin Grove, Australia
d Department of Physical Medicine and Rehabilitation, hôpital Raymond-Poincaré, AP–HP, CIC-IT 1429, Garches, France
*Corresponding author.
E-mail address: marjoriesalga@hotmail.fr (M. Salga)

Introduction  Neurological heterotopic ossifications (NHOs) are bone formations developed around joints following central nervous system lesion. The pathological mechanism remains unknown and there is no therapeutic option to prevent this complication. Several studies have examined the risk factors occurred in the NHO including spasticity. Some see it as a risk factor, others as a result of the formation of the NHO, which would act as an irritating factor. The objective of this work is to define the role of spasticity in the development of NHOs by injecting botulinum toxin into mice producing NHOs after spinal section.

Material and method  Thirteen wild mice C57/B16 benefited from T7 level of surgical spinal section associated with injections of 12.5 mg of cardiotoxin in the hamstrings to develop HOs. Among them, five mice received an additional injection of botulinum toxin in the ipsilateral hamstring at 20µl (1U/100 g body weight) 4 days before spinal section and 1 per week until sacrifice of the animal (14 days). A micro-computed tomography analysis was used to determine the bone volume (BV) of the HO.

Results  The mice in the 2 groups had 100% of spastic paraparesis and NHO, suggesting that botulinum toxin has no effect on their appearance. The BV average is 7.39 mm³ (± 5.79) for the control group and 12.35 mm³ (± 10.24) for the botulinum toxin group. The statistical analysis shows no significant difference between the 2 groups (Mann Whitney test. P = 0.17).

Conclusion  This study failed to show a modulation effect of spasticity on the development of HOs in mouse with spinal cord injury. Further studies with sciatic nerves section have to be realized in order to measure the impact of flaccid paralysis versus that of spastic paralysis in the development of these NHOs.

Keywords  Heterotopic ossification; Spinal cord injury; Spasticity; Botulinum toxin

Disclosure of interest  The authors have not supplied their declaration of conflict of interest.

http://dx.doi.org/10.1016/j.rehab.2015.07.187

CO23-007-e

Spasticity or restless legs syndrome?

E. Mauruc a, M.A. Quera-Salva (Dr) a, A. Brotier (Dr) a, C. Hugeron (Dr) b, C. Rech (Dr) a, D. Bensmail (Prof) a

Service de MPR, unité blessés médullaires, hôpital Raymond-Poincaré, AP–HP, université de Versailles Saint-Quentin, Garches, France
*Corresponding author.
E-mail address: elsamauruc@hotmail.fr (E. Mauruc)

Introduction  The Restless Legs Syndrome (RLS) is a sensorimotor disorder characterized by an urgent need to move the limbs (typically the legs), associated with unpleasant feelings,