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THERAPEUTIC BENEFIT OF BOTULINUM TOXIN A FOR SPASTICITY OF THE TRICEPS SURAE IN PATIENTS WITH MULTIPLE SCLEROSIS: AN OBSERVATIONAL STUDY ON GAIT SPATIOTEMPORAL PARAMETERS

Emilie Leblong*, Bastien Fraudet, Sabine Petrilli, Tiphaine Berthier, Katell Autret, Solenne Gambert, Carole Anne, Benoit Nicolas, Philippe Gallien
*Corresponding author : Pôle MPR St Hélier, 54 rue St Hélier, Rennes Cedex, 35043, France.
*E-mail adress:*emilie.leblong@pole-sthelier.com

Introduction and Objectives: Few data are available on the use of botulinum toxin for spasticity treatment in multiple sclerosis (MS). In a previous study we found that one of the main therapeutic goals in patients suffering from spasticity of the triceps surae was improvement in walking.
In this pilot observational study, we assessed the benefit of an injection of 200 international units (IU) of incobotulinumtoxinA in patients with multiple sclerosis suffering from spasticity of the triceps surae.This study was approved by the local Ethics Committee of the University Hospital of Rennes (France)

Inclusion criteria :

- MS patients with Expanded Disability Status Scale (EDSS) scores < 6
- required botulinum toxin for management of focal spasticity of the triceps surae.
  A second injection was allowed no less than 3 months after the first injection.

CLINICAL TESTS
Goal Attainment Scale (GAS),
Twelve Item MS Walking (MSWS-12) Scale, Timed Up and Go (TUG) Test,
6 Minute Walk Test (6mnWT).

PROSPECTIVE STUDY
22 multiple sclerosis patients (EDDS <6)

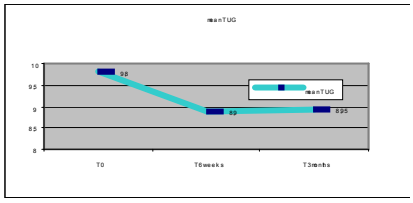
mean age of 48.2 +/-12 years
mean EDSS of 4.2 (median 4.7)

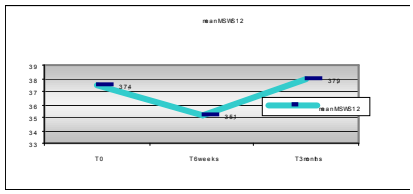
200 IU of incobotulinumtoxinA (Xeomin) at a dilution of 100 units in 3 milliliters injected into the triceps surae at 5 sites

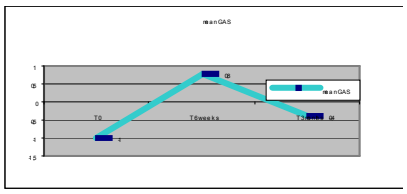
No adverse effects

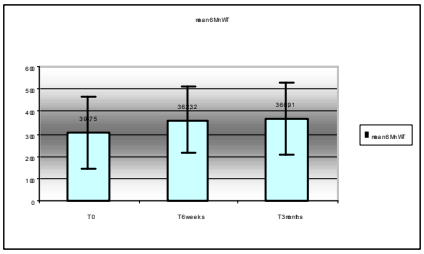
Outcomes measures at T0, T6weeks and T3months Post injection

GAIT ANALYSIS
Spatiotemporal gait data by barometric









	T0	T6weeks	T3months	p T0-T6weeks	p T0-T3months
maximum speed	111,97	110,13	118,36	*	**0.05**
step time IS	1,54	1,02	0,74	*	*
step lenght IS	43,48	47,68	50,16	**0,02**	**0,002**
stance time IS	0,63	0,56	0,41	*	*
swing time IS	0,46	0,61	0,47	*	*
step time NIS	1,57	1,62	1,4	*	*
step lenght NIS	42,04	44,71	48,43	*	**0,01**
stance time NIS	0,46	0,8	0,47	*	*
swing time NIS	0,63	0,52	0,41	*	*

IS : injected side, NIS : non injected side
* non significant

At 6weeks : significant improvement for GAS (p0.0077), MSWS12 (p 0.038) except for 6mnWT
At 3 months : **significant improvement for 6mnWT** (p0.0241), decrease of gain for subjective scales (GAS and MSWS12) and TUG.

At 6 weeks : non sigificant benefit on spatiotemporals parameters.
At 3 months : Significant benefit on injected (0.005) and non injected (0.01) step length measured by GaitRITE but not on support distribution (0.18; 0.38)

Conclusions: These results tend to confirm the interest in botulinum toxin A as a treatment for focal spasticity of the triceps surae with a significant improvement of gait especially on **speed, fatigability, and endurance with good tolerance.** Further studies are needed to confirm the utility of botulinum toxin in this indication and clarify guidelines for administration with respect to dosage and interval between injections. The best results on gait parameters are obtained after 3 months, but that is different from the results on the TUG Test and MSWS-12 Scale. The spatiotemporal parameters suggest a **central reorganisation on cerebral cortex of gait patterns in addition to peripheral role on spasticity at 3 months because of the physiological decrease of toxin's efficacy**.
These results support the role of botulinum toxin in the treatment of focal spasticity of the triceps surae in MS and are in concordance with the **French recommendations regarding focal spasticity treatment**. Botulinum toxin injections as a treatment option should probably be discussed earlier in the management of spasticity in MS patients.

Main references :
Feys, Spatiotemporal gait parameters in persons with MS according to disability level and motor imparment, Multiple Sceloris and related disorders (2013) 2, 238-246,
Wissel, botulinum toxin treatment of hip aductor spasticity in multiple sclerosis, 2001
Dressler, Botulinum toxin therapy for treatment of spasticity in multiple sclerosis : review and recommendations of the IAB-interdisciplinary working group for movement disorders task force, Journal of Neurology (2016)