THE IMPACT ON GAIT FUNCTIONALITY OF UPPER LIMB BOTULINUM TOXIN TREATMENT WITHIN AN INPATIENT REHABILITATION PROGRAM

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INTRODUCTION

Stroke is one of the leading causes of mortality and disability in all industrialized countries and after completing rehabilitation almost 50% of stroke survivors remain at least partially dependent. Post-stroke spasticity may impose a worse functional outcome as it can cause negative symptoms, increased difficulty in self-care and hygiene and limit activities of daily living and mobility.

Gait recovery is strongly associated to quality of life and is a major objective in most rehabilitation programs. The impact of upper limb botulinum toxin injections on gait recovery has been studied and it seems to improve gait as it controls associated reactions and improves balance and mobility.

OBJECTIVES

The aim of this study was to compare the gait functionality of stroke patients treated with botulinum toxin injections (BoNTA) exclusively in the upper limb (UL-BoNTA) during an inpatient rehabilitation program (IRP) with that of patients who received the usual multimodal treatment with or without BoNTA treatments.

MATERIAL AND METHODS

There were 41 post-stroke patients in the study group (UL-BoNTA); they were treated in an IRP with UL-BoNTA during the period from 2011 to 2016. The control group (CG) comprised all post-stroke patients (114) in their first IRP during the year of 2014.

Both groups received a multimodal rehabilitation program. In the CG patients might have included BoNTA treatment to upper limb, lower limb, both limbs or no BoNTA at all, as per clinical indication. In the study group all patients received BoNTA treatment exclusively to the upper limb.

Parameters studied were Berg Balance Scale (BBS), 10-meter walk test/velocity (10mWT), functional ambulation category (FAC), and functional independence measure (FIM) locomotion subscore (FIM-L) in groups (1-2; 3-4; 5-7) .

Statistical analysis was performed using the SPSS software, version 15.0. Statistical significance was assumed for p≤0.05

RESULTS

Patients' characteristics regarding age (64 years in both groups), gender (males comprised 43.9% and 48.8% of the CG and UL-BoNTA groups, respectively), etiology (73% and 78% were ischemic), and length of stay (median, 69 days for both groups) were homogeneous. The most affected hemisphere in the CG was the right (46.5%) and in the UL-BoNTA group was the left (53.7%; *P*=0.02). Patients in the CG were in an earlier stage (median stroke-to-admission interval, 59 and 107 days, respectively). Among the CG, 18% were treated with BoNTA (1 UL, 8 lower limb, 13 upper + lower limbs).

	Control group	UL-BoNTA
	N=114	N=41
Mean age (years)	63,8 (SD13,3)	64,2 (SD12,6)
Gender		
Male	43,9%	48,8%
Female	56,1%	51,2%
Etiology		
Ischemic	0,7	0,8
Lentgh of stay	69 days	69 days
Stroke localization		
Right hemisphere	46,5%	36,6%*
Left hemisphere	39,5%	53,7%*
Subhemispheric	13,0%	4,9%*
Mean stroke-to-admission interval	59 days	107 days
BoNTA injections	22 patients	41 patients
Upper limb	1	
Lower limb	8	41
Upper+Lower limbs	13	
Mean admission FIM	66	73

FIG 1: Patients' characteristics for both groups. *p=0,02 for stroke localization. In all others the differences are not significant.

Gait tests at admission showed FIM-L 1-2 in 54.4% of CG and 3-4 in 46.3% of UL-BoNTA (*P*=0.08) patients; at discharge, 78.9% and 80.5%, respectively, had a favorable evolution, with FIM-L 5-7 in 42.1% of the CG and 61% of the UL-BoNTA patients (*P*=0.43).

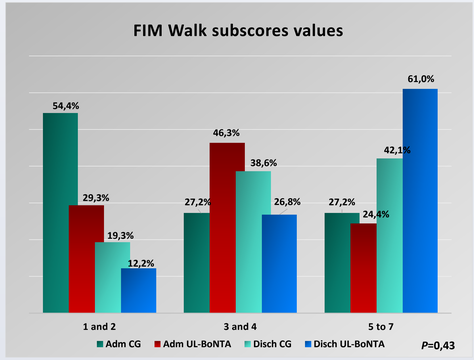

Fig. 2: FIM Walk subscores at admission and at discharge

FIM-L gain was 1 point in 34.2% and 39% and 2 points in 31.6% and 34.1% of CG and UL-BoNTA patients, respectively (*P*=0.85).

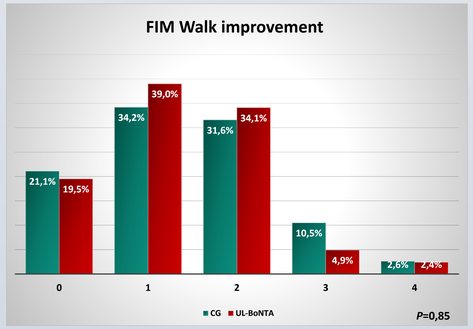

Fig. 3: Number of points improved at FIM Walk subscores in both groups

BBS improved in 78.9% and in 82.9%; FAC improved 1 category in 31.6% and 36.6% and 2 categories in 28.1% and 26.8% (*P*=0.97), and gait velocity improved in 64% and 61% of patients in CG and UL-BoNTA groups, respectively. Mean values are shown on figure 4.

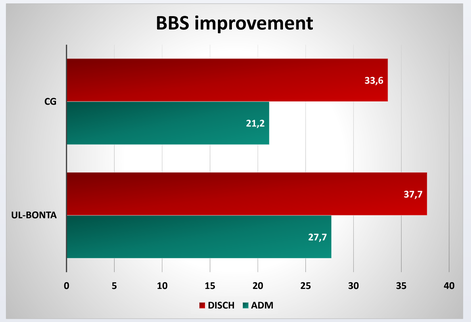

Fig. 4: BBS at admission and at discharge

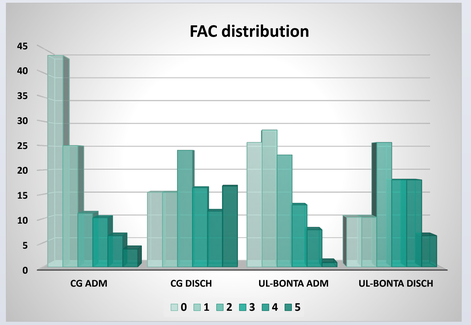

Fig. 5: Percentage of patients per FAC categories at admission and at discharge for both groups

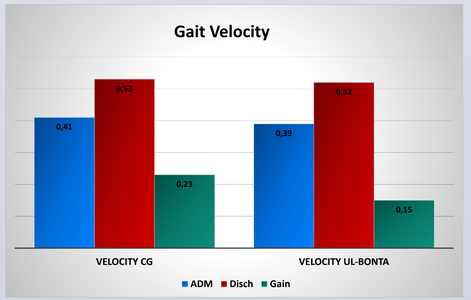

Fig. 6: Mean gait velocity at admission, discharge and change

CONCLUSIONS

The patients in the CG tended to be in an earlier stage post stroke and to have slightly lower FIM-L scores at admission. Other than that, the groups were homogeneous.

Functional gains related to locomotion/gait of the UL-BoNTA group were similar to those of patients in the CG, which highlights that in selected cases, BoNTA injection even of the upper limb only was a relevant contributor to these gains.

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