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Short-term effect of botulinum toxin a injection on spastic arm function in post-stroke patients – preliminary findings

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Abstract

BACKGROUND: Despite efforts of scientists and clinicians evidences for the effectiveness of post-stroke rehabilitation programmes following BTX-A injection still look weak and unclear.
OBJECTIVE: To evaluate the therapeutic effect of botulinum toxin A (BTX-A) injection on spastic upper limbs muscles.
CASE STUDIES PRESENTATION: Six ambulatory post-stroke patients were recruited in this study. All parameters was measured twice: before the injection and after 4±1 weeks of treatment. The participants received the same number of therapeutic sessions (ambulatory physiotherapy: 5 days a week). A significant decrease in the AS/MAS and MRC scores observed after treatment showed improvement.
CONCLUSIONS: Treatment with BTX-A, initially expensive, may be regarded as effective due to low incidence of side effects, short period of hospitalization (if necessary), and reduction in the use of other drugs/therapies.

Introduction

Despite efforts of scientists and clinicians evidences for the effectiveness of post-stroke rehabilitation programmes following BTX-A injection still look weak and unclear [1, 2].

This study aims at evaluation the therapeutic effect of botulinum toxin A (BTX-A) injection on spastic upper limbs muscles.

Case studies presentation

Case study analysis was made in six adult patients with post-stroke spasticity (females=50%, mean age 52.5, mean time after cerebrovascular accident (CVA): 7.5 years). Patients were recruited and selected on the basis of the following inclusion criteria: age ≥ 18 y.o., spastic upper limbs muscles, fail of previous therapeutic attempts, lack of contraindications to BTX-A therapy, further physiotherapy.

The study was conducted in accordance with the and the Helsinki Declaration and the rules of Good Clinical Practice. Written informed consent was obtained from each patient before the study.

The intervention was provided in 2015. Doses varied depending on the patient. All parameters was measured twice: before the injection and after 4±1 weeks of treatment. The participants received the same number of therapeutic sessions (ambulatory physiotherapy: 5 days a week).

Table 1. Patients' overall profile.

No of patient	Sex	Age at admission	Time after CVA [years]	Change of clinical outcomes				
				MMSE	AS	MAS	MRC	CGI-I
1	F	31	12	norm	1	1	2	0
2	F	51	5	norm	0	0	0	0
3	M	51	7	norm	1	1	1	0
4	M	55	4	norm	1	1	1	0
5	M	59	9	norm	0	0	0	0
6	F	68	8	norm	1	1	1	0

Abbreviations: AS- Ashworth Scale, MAS- Modified Ashworth Scale, MRC -Medical Research Council Scale for Muscle Strength, CGI-I - Clinical Global Impression – Global Improvement Scale, MMSE - Mini–Mental State Examination.

Clinical outcome of MMSE in all patients remained norm. Mean values of positive changes of the clinical scores and scales were as follows:

- AS: 0.67,
- MAS: 0.67,
- MRC: 0.83,
- CGI-I: 0.

Discussion and conclusions

Outcomes in the study group are lower but generally consistent with mean gain in AS/MAS in early rehabiltiation group: about 1 point in the 4-6 weeks post injection with large variability of the aforementioned score [3]. Onset of BTX action takes usually two to five days (but occasionally it may take even up to two weeks). BTX action lasts for six weeks to

six months (a mean value: three to four months) and then decreses gradually [4, 5]. Reversal local paralysis is caused by two main mechanisms: "neuronal budding" and regeneration of acetylcholine coupling proteins in the vesicles [6, 7]. BTX action influences histological assessment which shows muscular atrophy and changes within the fibers. Described potential of BTX-A lies in temporary decreasing post-stroke excessive muscle contraction or tonus [8]. Generally it provides selective weakness of painful muscles and disruption of the spasm-pain cycle. Associated pain pain relief allows patients to perform exercises within the rehabilitation programme – key element of the long-term recovery [9].

BTX-A is promising in the treatment of late post-stroke changes however further studies are still necessary. Thus presented results may be regarded as preliminary. There is many unanswered questions on BTX-A and its therapeutic application in late rehabilitation of post-stroke patients. In is very important since BTX-A has been used for twenty years within the treatment of more than one million patients around the world (in 73 countries) [10].

Physical therapy after injection is key to maximize benefits of BTX-A. Passive stretching, active stretching, neuromuscular reeducation, posture and joint mechanics reestablishment, reflexes recovery can improve and normalize (where available) patient functional status [11, 12].

BTX-A is regarded as safe and well tolerated, but strict regimen should be applied to avoid side effects. Treatment with BTX-A, initially expensive, may be regarded as effective due to low incidence of side effects, short period of hospitalization (if necessary), and reduction in the use of other drugs/therapies [13].

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