

Applications of Botulinum Toxin A (Botox) in the treatment of spasticity of the upper extremity in children with cerebral palsy (CP)

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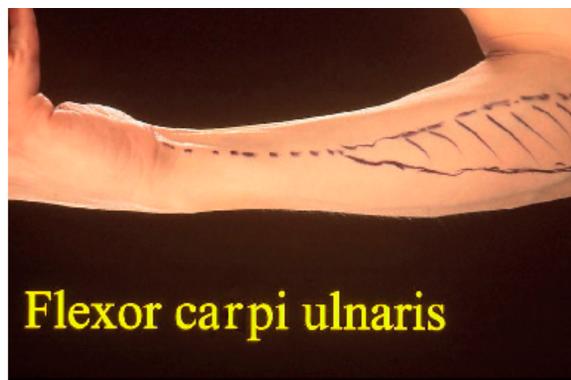
Botulinum Toxin(BTX)

is a mixture of various proteins, produced by the anaerob bacteria Clostridium botulinum. The biologically active component is BTX neurotoxin.

By intramuscular injection BTX induces a blockade of the cholinergic innervation of the target muscle and so reduces muscle tone. BTX causes a slight local paresis. The paresis is reversible within 3-6 months.

The aim of the study

The indications for use of Botulinum toxin A (BTX-A) have been preoperative evaluation, improvement of function and quality of movement, control of increasing spasticity or reduction of pain. The purpose of this study is to prospectively analyse the outcome of the use of BTX-A in combination with occupational therapy in improvement of function and cosmesis.



Flexor carpi ulnaris

Design and method

A simple clinical investigation of the effect of the treatment, where each patient makes out his own control. The study lasts a year.

Children

- 10 children with cerebral palsy were included
- 3 girls and 7 boys
- Average age of 8.7 years

Inclusion criteria

- Range 2-15 years
- Pronation deformity, wrist flexion deformity and thumb in palm, secondary to spastic CP
- Be able to co-operate

Exclusion criteria

- Other sicknesses within the central nerve system, periphery nerve diseases or muscle sicknesses
- Earlier surgical operations on the upper extremities



Adductor pollicis

Treatment

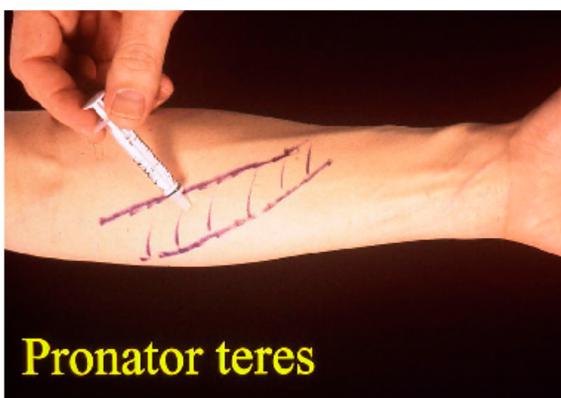
- ◆ A combined neuropaediatric, handsurgical and occupational therapy test with reference to which muscles are to be injected
- ◆ Injections of BTX-A included 7 into the flexor carpi ulnaris (FCU), 8 pronator teres (PT), and 7 thumb adductors (Ad. P) (Dosage Botox 1 unit/ kg/muscle)
- ◆ Injection followed the application of EMLA and premeditation
- ◆ Electromyography were used to verify location of the offending muscle
- ◆ Outcomes of this intervention were assessed by eight different methods including video documentation
- ◆ The children were instructed in home therapy 1 month pre-injection, which was carried out daily through the project-period

Assessments

Pre-injection and 1, 3, 6 and 12 months after injection

1. Thumb in palm
2. Ashworth-scale
3. Hand-and forearm circumference (muscle volume)
4. Stereognosis
5. Semmes-Weinstein
6. Pick-up velocity test
7. 3 Activities of daily living (ADL)
8. Functional classification (House)
9. Visual analogue scale of function
10. Visual analogue scale of cosmesis

1, 2, 3, 9 and 10 assessed by MD 4, 5, 6, 7, 8 assessed by OT (6 and 7 is video recorded)



Pronator teres

Results

All children exhibited therapeutic response to the injection all except one with improved functional results. Functional improvement at one-year post injection was documented.

Statistically significant is found in: (Wilcoxon signed rank test)

- ◆ Stereognosis up to 12 m (p=0.023-0.004)
- ◆ Visual analogue scale of function up to 12 m (p=0.012-0.027)
- ◆ Visual analogue scale of cosmesis 3 m post-inj (p=0.027)
- ◆ Ashworth Scale 3 m post-inj for PT and FCU (p=0.016-0.031)
- ◆ Functional classification (house) 3 m to 12 m (p= 0.014-0.021)

	Pre-inj.	1 month post-inj.	3 month post-inj.	6 month post-inj.	12 month post-inj.
Boy age 9	4	-	4	6	5
Girl age 10	4	-	5	4	4
Boy age 14	4	5	5	5	5
Boy age 7	4	5	6	5	5
Boy age 4	2	4	4	-	5
Girl age 4	4	5	5	5	6
Boy age 4	3	4	4	4	5
Boy age 9	5	5	5	5	5
Girl age 4	3	3	4	4	4
Boy age 11	5	5	5	-	5

Table:
Functional classification (House) on 3 video recorded Activities.

Assessments 1; 3; 5;6 are not valid. One of the reasons being that most children were not able to collaborate on these (particular) assessments.

Conclusion

The weaknesses of this study include the small numbers and concerns regarding accurate outcome assessment of the spastic upper extremity in CP.

It seems that BTX-A into the FCU, Ad.P and PT are effective in improving function especially in the young children age 4, and that video documentation is a good tool to show the functional improvement.

Acknowledgments

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