



# Crucial points in ambulatory occupational and physical therapy in children with cerebral palsy and multilevel botulinum toxin treatment

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## INTRODUCTION

Over 80% of children with cerebral palsy (CP) show reduced mobility due to generalized spasticity. Goal of physical- and occupational therapy is to achieve and exercise new movement patterns within the context of spasticity. By adding multilevel Botulinum toxin type A (BoNT-A Botox®) injections, several effects can be observed: increased dynamic mobility, improved gait patterns, and reduced risk of secondary and tertiary problems, which prepares for a better neuroorthopedic future.

## PROCESSES OF PHYSICAL AND OCCUPATIONAL THERAPY AT Z.E.N.

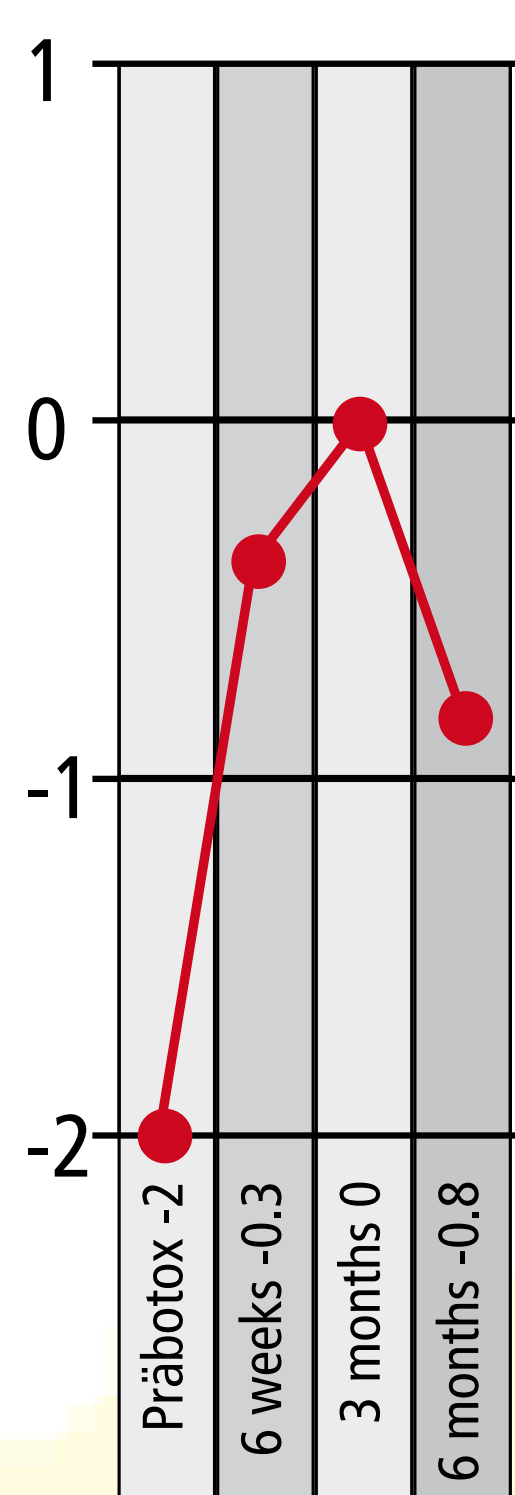
1. Examination „pre-Botox®“
2. Goal setting with multidisciplinary team, child and parents (Goal Attainment Scaling GAS)
3. Production and adjustment of orthopedic devices and splints
4. Assistance at Botox®-injections, plastering and splint adjustment
5. Physical / occupational treatment during the cast period of two weeks
6. Frequency of the therapy is 1-3 times weekly and an individual training program carried out at home
7. Evaluation 6 weeks, 3 months and 6 months post-Botox®, adaptation of therapy goals
8. If necessary, repetition of Botox® treatment not before 3 months

## METHODS

Our experiences are based on 175 children and youth (age range: 1,5 - 20 years) with CP, treated several times with Botox® between 2000 and 2006. 91 patients were injected in the lower limbs, 38 in the upper limbs and 46 in both upper and lower limbs. Treatment results were evaluated using clinical measures and scores (Ashworth, Range of Motion, Analysis of gait pattern, Goal Attainment Scaling (GAS), etc.) and parental questionnaires.

## GOAL ATTAINMENT SCALING (GAS)

means goal attainment 6 weeks, 3 months and 6 months after Botox® treatment



The results show an average goal attainment of more than -2 (pre-Botox® situation) after elaborate therapeutic intervention in close cooperation with the child and his parents. Best results were achieved after an average duration of 3 months. With intensive training, treatment results can be maintained over a prolonged period of time.

- 2: Pre-Botox® situation / no change
- 1: Minor / moderate change (therapy goal not achieved)
- 0: Therapy goal achieved
- +1: Result better than previously set therapy goal

## RESULTS

### Prognostic factors of successful therapy:

- Focal spasticity, low grade of paresis, dynamic muscular situation, selective intentional activity, unaffected collagen tissue
- Realistic and unambiguous goal setting
- Cooperative and motivated patient
- Unaffected sensory functions

### Early start of multidisciplinary spasticity treatment

### Crucial points in occupational therapy:

1. Early and continuous Neurodevelopmental Treatment NDT (specific training by everyday activities)
2. Adjustment and control of orthopedic aids at the upper limb (nocturnal arm splint, wrist brace splint, thumb abduction splint with a circumferential wrap to provide some supination, Johnstone splint)
3. Implementation of „Constraint Induced Movement Therapy“ (a rehabilitation method of training the upper limb functions while immobilizing the unaffected hand)

### Crucial points in physical therapy:

1. Early and continuous Neurodevelopmental Treatment NDT
2. Adjustment of orthopedic devices, including wheel chair, sitting and lying aids in cooperation with orthopedics
3. Lower leg casts for 2 weeks after Botox®-injection in both M. gastrocnemii (also in hemiplegia cases)
4. Adjustment of aids such as diurnal and nocturnal splints and Cat-Twister
5. Complementary therapies, e.g. Proprioceptive Neurological Facilitation (PNF), manual mobilization, osteopathic therapy

## CONCLUSION

In the treatment of children with spastic CP, a multidisciplinary concept proved to be successful in terms of motor function. Involved were occupational and physical therapy, sometimes in cooperation with further therapists (e.g. osteopaths), supported by orthopedic devices, Botox® treatment and, in some cases, systemic antispasticity agents.

**Our experiences show the above mentioned crucial points in occupational and physical therapy which decisively influence the success of the treatment.**

### Literature

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- Blue Book Therapie der CP mit Botulinumtoxin Grundlagen, Praxis, Atlas, Steffen Berweck & Florian Heinen, 2002
- Cerebral Palsy, Freeman Miller, Springer Science+Business Media, 2005
- Infantile Zerebralparese und ihre Behandlung mit Botulinumtoxin Typ A, Leitfaden für Eltern, PTS media consulting
- Spasticity Management, a practical multidisciplinary guide, V. Stevenson, Informa Healthcare, 2006

Presented in Barcelona on EACD, October 2006

## EXAMPLES OF OCCUPATIONAL THERAPY

4 year old child (right sided hemiplegia) with typical pattern of flexion of hand muscles Botox® in M. pollicis adductor



Pre-Botox®: Flexed thumb



3 months post-Botox®: Improvement of functions of hand and thumb under specific occupational therapy by employing a mechanical aid to support thumb stability. In the long term, grasping and thumb activity are maintained by continuous use of hand function.



## EXAMPLES OF PHYSICAL THERAPY

4 year old child (right sided hemiplegia) Botox® in M. gastrocnemius



Improvement of selective foot extension activity and of the gait pattern by specific physical therapy and adjustment of orthopedic aids (in this case: Cat-Twister and splints)

3 year old child (tetraplegia) Botox® in M. triceps surae



Leg splints which are bandaged up to control the knee extension by training of the hip stability and the hip extension.

5 year old child (diplegia) Botox® in hamstrings und M. gastrocnemius



After Botox®-injection, nocturnal splints were adjusted in order to facilitate muscle and joint mobility by nocturnal relaxation or to support the physical therapy.