소아재활

게시일시 및 장소 : 10 월 19 일(토) 08:30-12:30 Room G(3F)

질의응답 일시 및 장소 : 10 월 19 일(토) 11:00-11:30 Room G(3F)

P 3-27

Changes of mass of muscle after botulinum toxin injection in spastic hemiplegic cerebral palsy

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Introduction

Botulinum toxin injections are widely used to control spasticity in cerebral palsy and have been proved effective in improving spastic equinus and gait pattern. Although it is considered safe in general, there is a concern that BoNT-A injections may negatively effect on muscle mass and strength. The purpose of this study was to measure the properties of botulinum toxin injected and non-injected muscle and to evaluate muscle mass changes after injection in spastic hemiplegic cerebral palsy patients.

Methods

Children who were diagnosed with hemiplegic cerebral palsy with tip-toeing gait in affected side aged between 2 and 18 years were prospectively enrolled for the study. The participants were injected with botulinum toxin [Botox, Type A; Allergan] on spastic lower extremity. The lean muscle mass were measured by Dual-Energy X-Ray absorptiometry at baseline, 4 weeks, and 12 weeks after botulinum toxin injection.

Results

A total of 14 children with hemiplegic cerebral palsy (8 males and 6 females; age range 3-11 years, mean age 5.29 ±2.60 years) were analyzed for the study. 4 weeks after botulinum toxin injection, the muscle mass of the injected leg decreased as compared to the non-injected side. However, the decrease in muscle mass was recovered within 12 weeks (Table 1). In consideration of the physiological increase of muscle mass during development, we compared the ratio of injected leg mass to uninjected leg or total body mass. The compared the ratio of injected leg mass to uninjected leg or total body mass was significantly reduced 4 weeks after injection. But, after 12 weeks, the muscle loss was meaningfully recovered, when compared with 4 weeks ago (Table 2, Table 3).

Conclusions

Our findings suggest that even if the botulinum toxin injection on spastic muscle in children with hemiplegic cerebral palsy causes the loss of muscle mass at 4 weeks after injection, the muscle mass can be eventually restored within 12 weeks of injection.

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Table 1. Muscle mass (mean ± SD, g) after botulium toxin injection analyzed by Dual-Energy X-Ray absorptiometry

	Initial	After 4 weeks	After 12 weeks
Injected leg	2032 ± 930	1996 ± 879	2168 ± 1016†
Non-injected leg	2231 ± 1021	2300 ± 1021*	2408 ± 1086†
Total	14721 ± 5184	14905 ± 5068	15284 ± 5277

Data are presented as means ± standard deviations.

Wilcoxon signed rank test

*p-value < 0.05, significant difference compared with initial muscle mass

† p-value < 0.05, significant difference compared with 4 weeks muscle mass after injection

Table 2. Muscle mass ratio to total body (mean ± SD, %) after botulinum toxin injection

	Initial	After 4 weeks	After 12 weeks
Injected leg	13.45 ± 1.43	13.08 ± 1.41*	13.79 ± 1.58†
Non-injected leg	14.79 ± 1.71	15.10 ± 1.86**	15.37 ± 1.88

Data are presented as means ± standard deviations.

Wilcoxon signed rank test

*p-value < 0.01, **p-value < 0.05, significant difference compared with initial muscle mass

† p-value < 0.01, significant difference compared with 4 weeks muscle mass after injection

Table 3. Muscle ratio of injected leg to uninjected muscle (mean ± SD, %) after botulinum toxin injection

	Initial	After 4 weeks	After 12 weeks
Injected leg / Non-injected leg	0.912 ± 0.038	0.870 ± 0.051*	0.899 ± 0.38†

Data are presented as means ± standard deviations.

Wilcoxon signed rank test

*p-value < 0.01, significant difference compared with initial muscle mass

† p-value < 0.01, significant difference compared with 4 weeks muscle mass after injection