Treatment of hypertonia using botulinum toxin

CONTENTS

01

Upper limbs

- Study methods
- Target muscles
- Injection techniques
- Results

Study methods

Treatment of upper limb hypertonia using Neuronox®

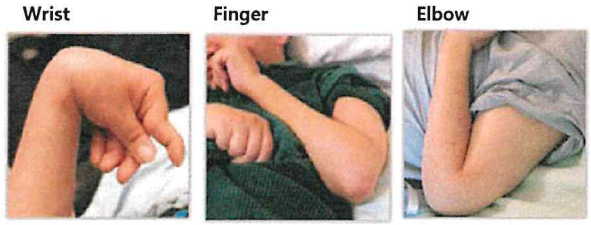
· **Design**

- A randomized, double-blind, multicenter, active-drug-controlled, phase Ⅲ clinical trial.

· **Patients**

- Stroke patients with moderate to severe upper limb spasticity who were ≥ 20 years

· **Definition of upper limbs :**

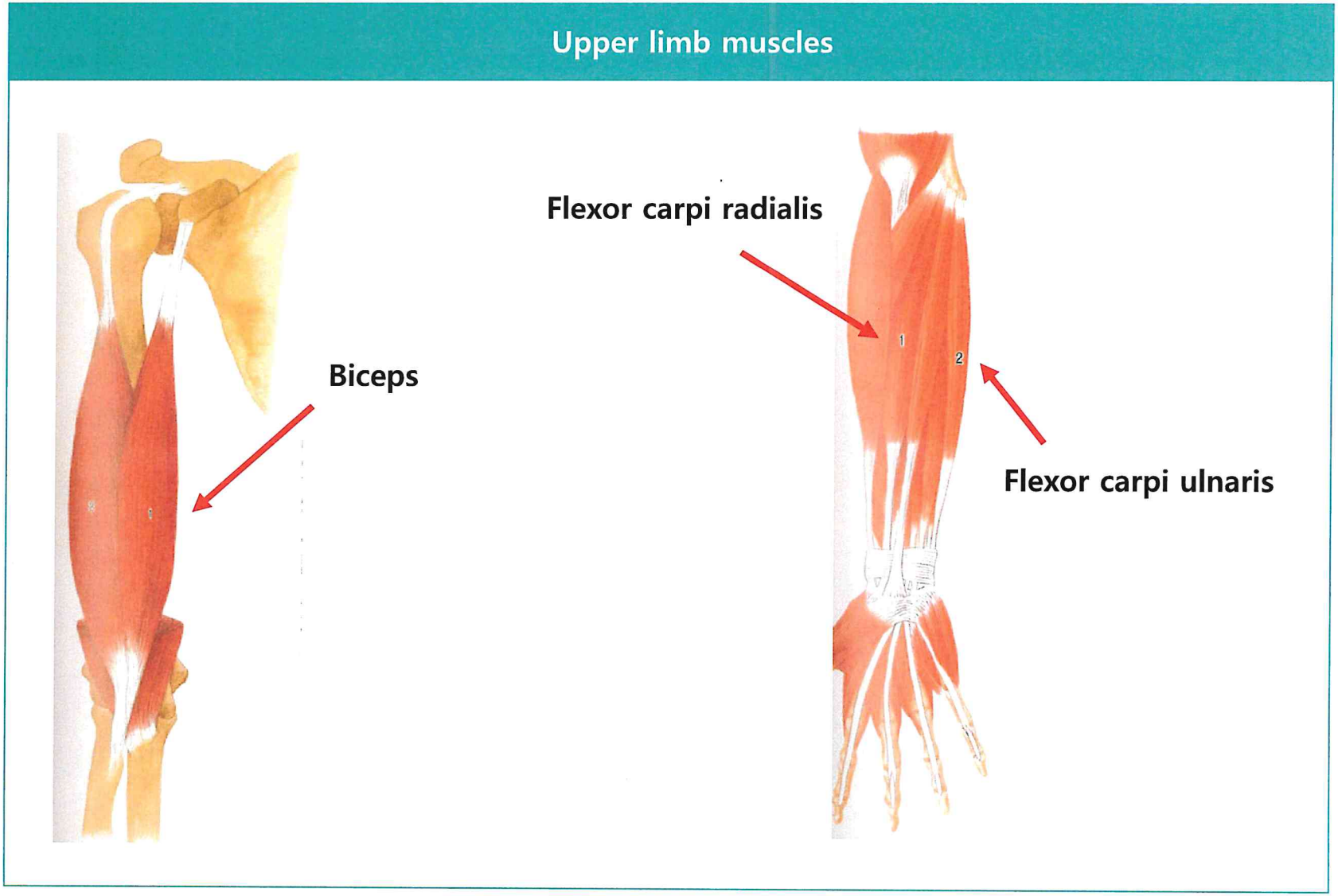


· **Endpoints**

- Primary endpoint: Change of spasticity score from baseline at the wrist flexors at week 4.
- Secondary endpoints:
  * Change of spasticity score from baseline at the wrist flexors at week 8, 12.
  * Change of spasticity score from baseline at the finger flexors at week 4, 8, 12.
  * Change of spasticity score from baseline at the elbow flexors at week 4, 8, 12.

HG Seo, et al. PLoS ONE 10(6): e0128633 2015

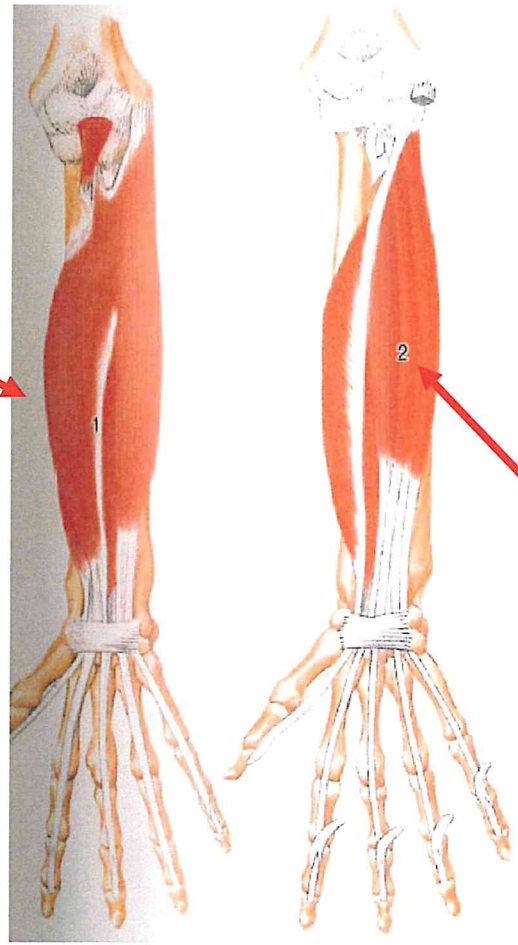
Target muscles



Bok Hyun Kim et al. Anatomy exercise book of neuromusculoskeletal system. Daekyung books. 2010

Target muscles

Upper limb muscles

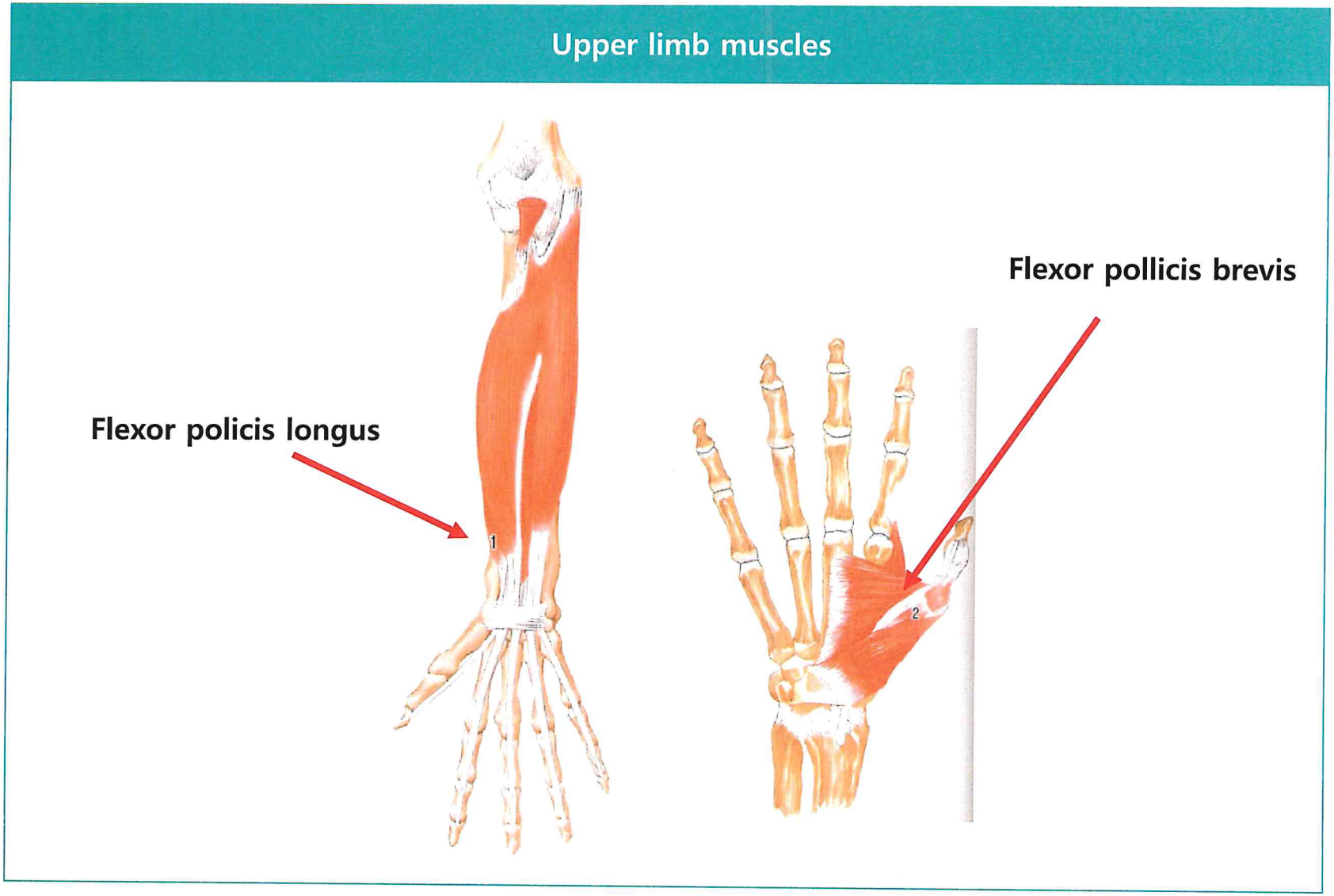


Flexor digitorum superficialis

Flexor digitorum profundus

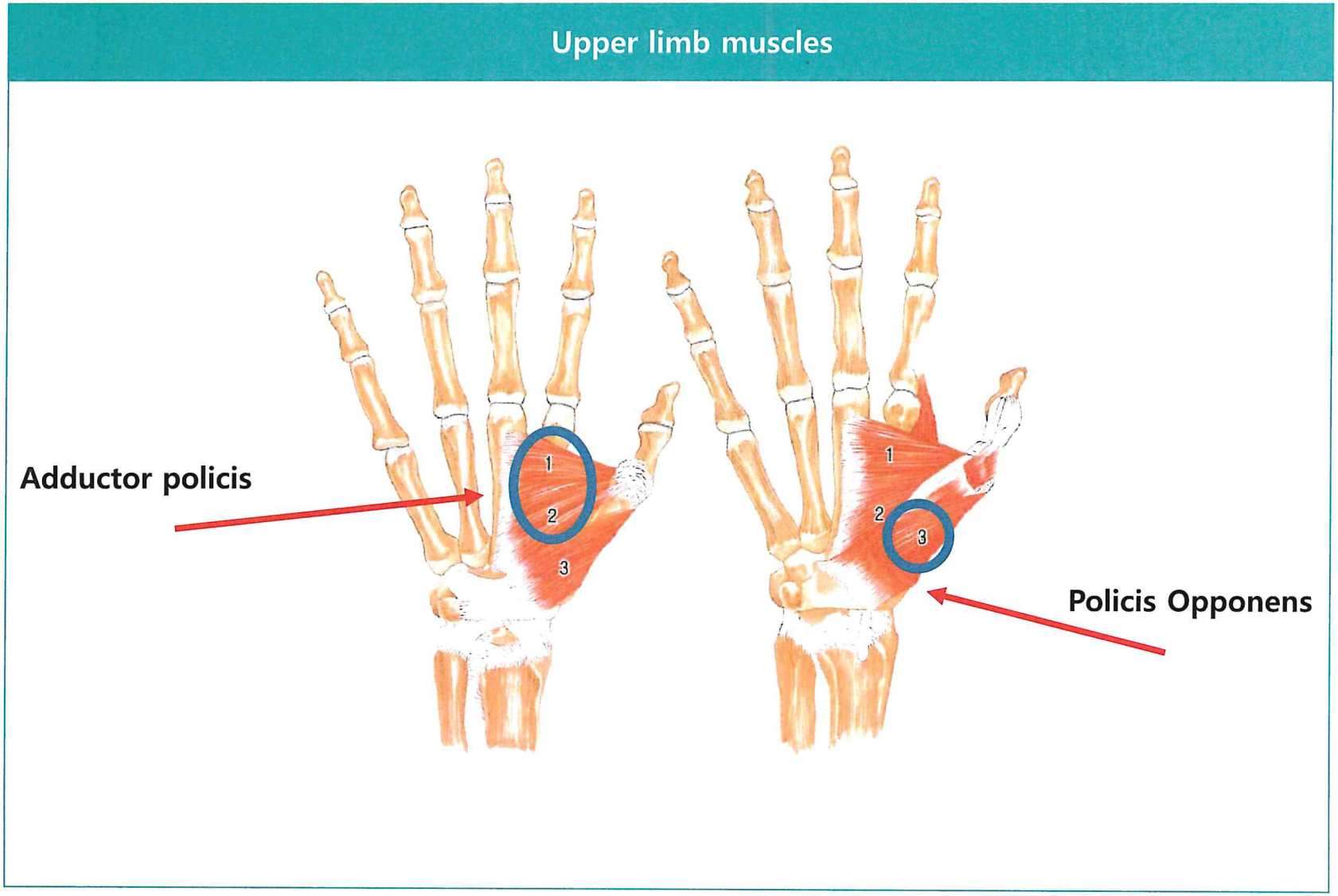
Bok Hyun Kim et al. Anatomy exercise book of neuromusculoskeletal system. Daekyung books. 2010

Target muscles



Bok Hyun Kim et al. Anatomy exercise book of neuromusculoskeletal system. Daekyung books. 2010

Target muscles



Bok Hyun Kim et al. Anatomy exercise book of neuromusculoskeletal system. Daekyung books. 2010

Injection techniques

Selection of muscles and doses to be injected was determined by the physician based on study guideline and clinical assessment.

· The maximal total dose of BoNT-A was 360U. Experienced physicians performed the intervention under electrical stimulation or electromyographic guidance.

	Muscle	Dose	Site
Mandatory	**Wrist flexors**		
	- Flexor carpi radialis	15~60U	1~2 sites
	- Flexor carpi ulnaris	10~50U	1~2 sites
Muscle with ≥ 1 point MAS	**Clenched fist**		
	- Flexor digitorum superficialis	15-50U	1~2 sites
	- Flexor digitorum profundus	15-50U	1~2 sites
	Flexed elbow		
	- Biceps	100-200U	Up to 4 sites
	Thumb-in-palm		
	- Flexor pollicis longus	0-20U	1~2 sites
	- Adductor pollicis	0-10U	1~2 sites
	- Flexor pollicis brevis/opponens	0-10U	1~2 sites

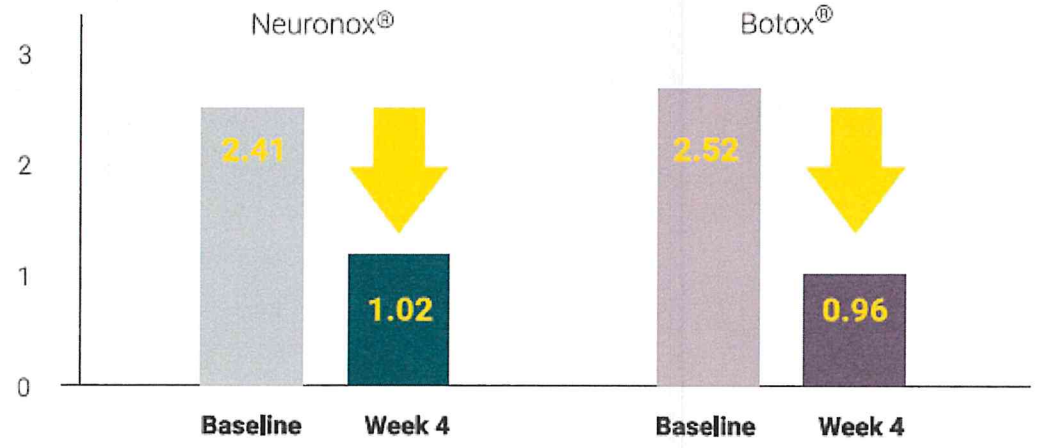
HG Seo, et al. PLoS ONE 10(6): e0128633 2015

Results

Treatment of upper limb hypertonia using Neuronox®

· **Primary endpoint**

- The changes of spasticity score from baseline at the wrist flexors at week 4 were -1.39±0.79 in the Neuronox® group and -1.56±0.81 in the Botox® group, indicating Neuronox® showed equivalent efficacy when compared with Botox®.



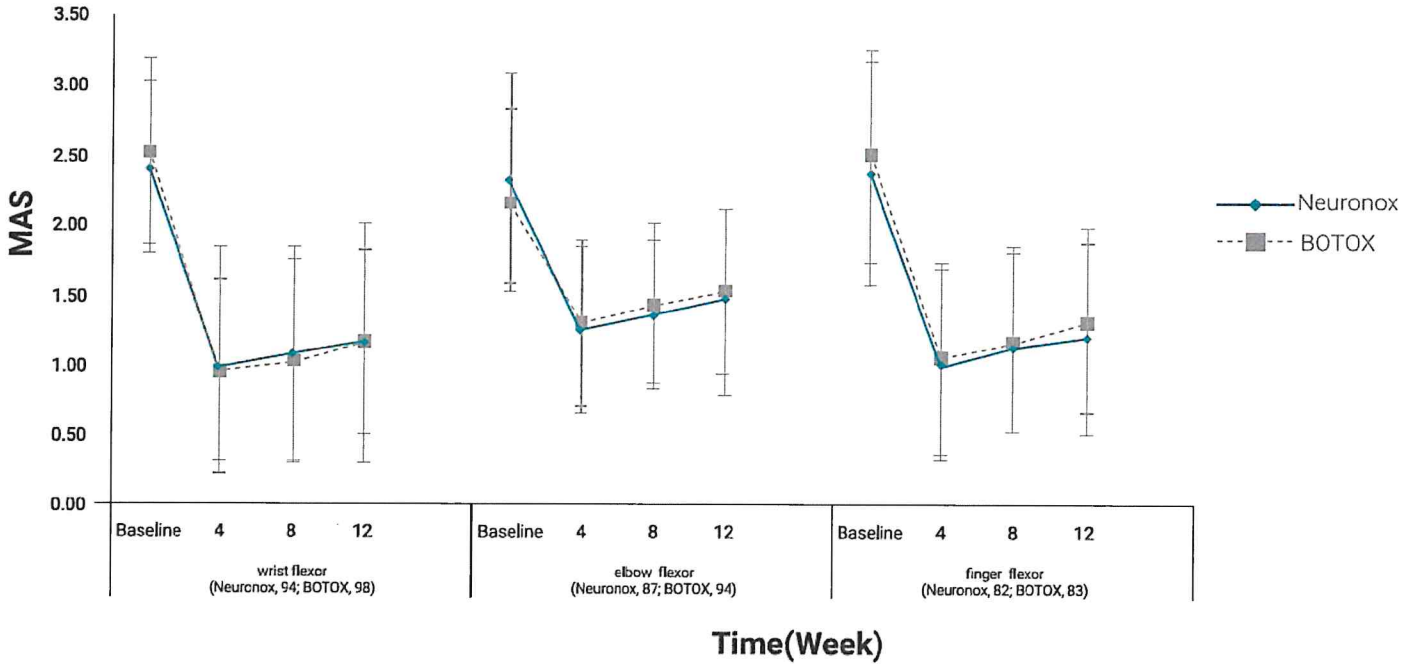
HG Seo, et al. PLoS ONE 10(6): e0128633 2015

Results

Treatment of upper limb hypertonia using Neuronox®

· **Secondary endpoints**

- Changes of spasticity scores at each muscle group from baseline at week 4, 8, 12.



HG Seo, et al. PLoS ONE 10(6): e0128633 2015

02

Pectoral muscles

- Study methods
- Target muscles
- Injection techniques
- Results

Study methods

Treatment of pectoral muscle hypertonia using Botox®

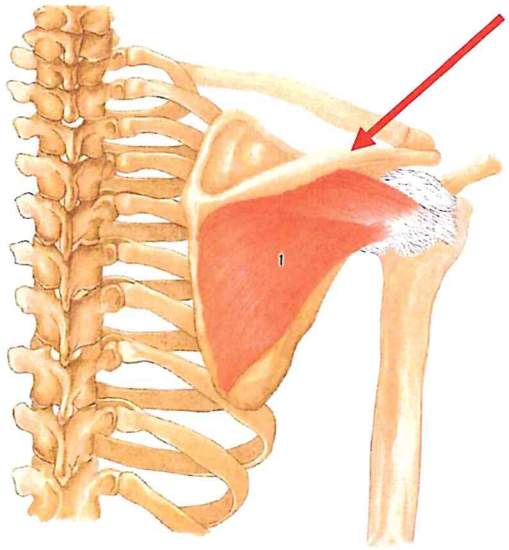
- **Design**
  - A prospective, randomized, double-blind controlled clinical trial.
- **Patients**
  - Patients with hemiplegic shoulder pain with a limitation of passive external rotation of the hemiplegic shoulder of at least ≥20° compared with the unaffected side.
- **One of the causes of shoulder pain :**
  - Hypertonia of muscles around the shoulder.
- **Endpoints**
  - * Decrease of pain score from baseline at the shoulder at week 12.
  - * Improvement in overall ROM(range of motion) from baseline at the shoulder at week 12.

Stroke. 2008 Jan;39(1) 126-31.

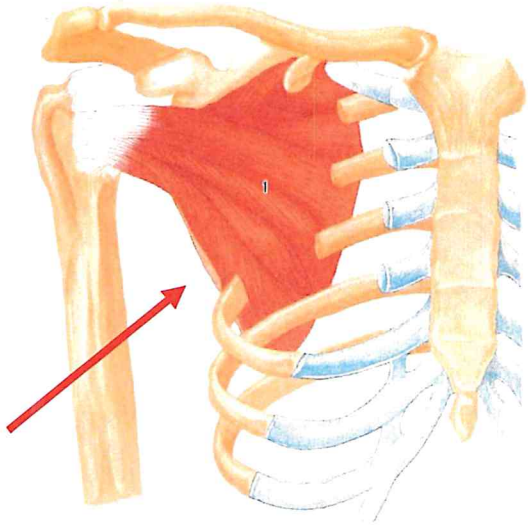
Target muscles

Injected muscles

Infraspinatus muscle



Subscapularis muscle

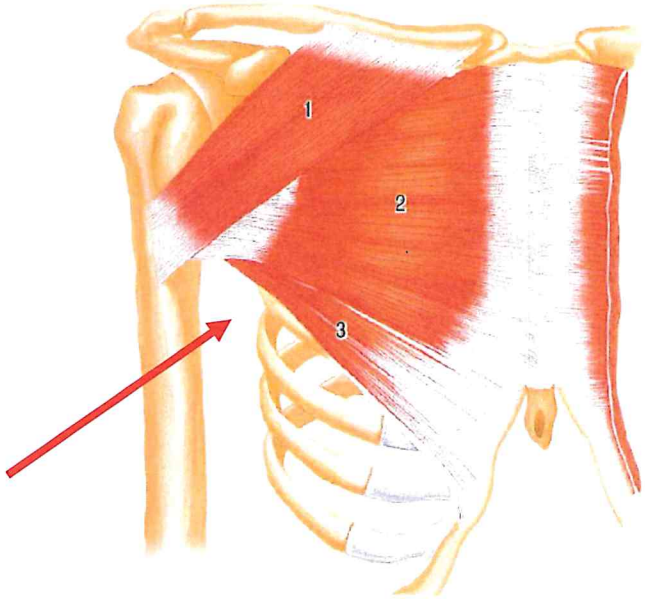


Bok Hyun Kim et al. Anatomy exercise book of neuromusculoskeletal system. Daekyung books. 2010

Target muscles

Injected muscles

Pectoralis major muscle



Bok Hyun Kim et al. Anatomy exercise book of neuromusculoskeletal system. Daekyung books. 2010

Injection techniques

Selection of muscles and doses to be injected was determined by the physician based on study guideline and clinical assessment.

- Botox was injected into the infraspinatus, subscapularis and pectoralis muscles.
- Botox was injected using a 27 gauge needle under the electromyographic guidance.
- One vial of Botox (100U) was reconstituted with 4.0 mL of saline at a concentration of 25 U/mL.
- Each muscle was injected at 2 points at least and no one injection point received more than 25 U.
- The maximum total dose in any one muscle was 50 U and a maximum total dose per patient was 100 U.

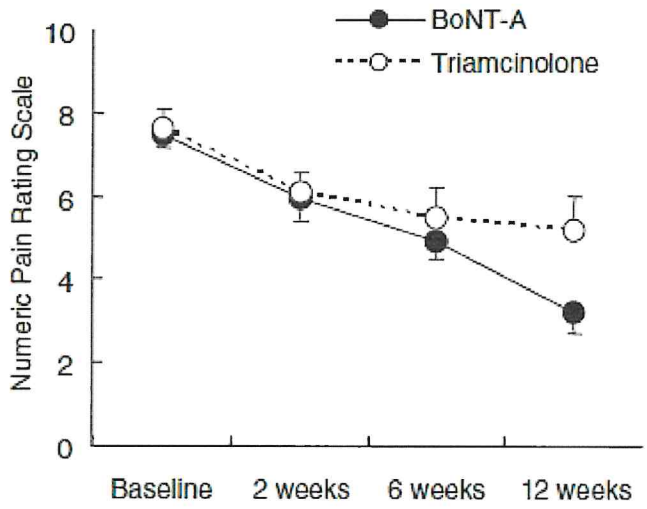
Stroke. 2008 Jan;39(1) 126-31.

Results

Treatment of pectoral muscle hypertonia using Botox®

· **Endpoint (1)**

- At 12 weeks after the treatment, mean decrease in pain was 4.2 in the BoNT-A-treated group versus 2.5 in the TA(triamcinolone acetonide) group (P=0.051).



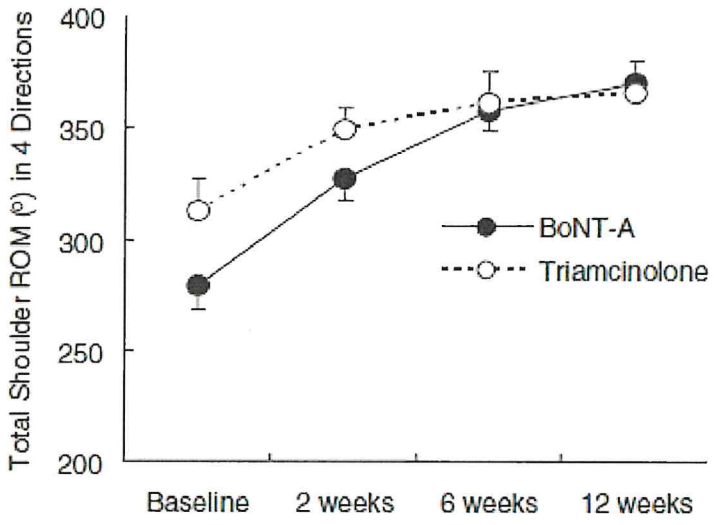
Stroke. 2008 Jan;39(1) 126-31.

Results

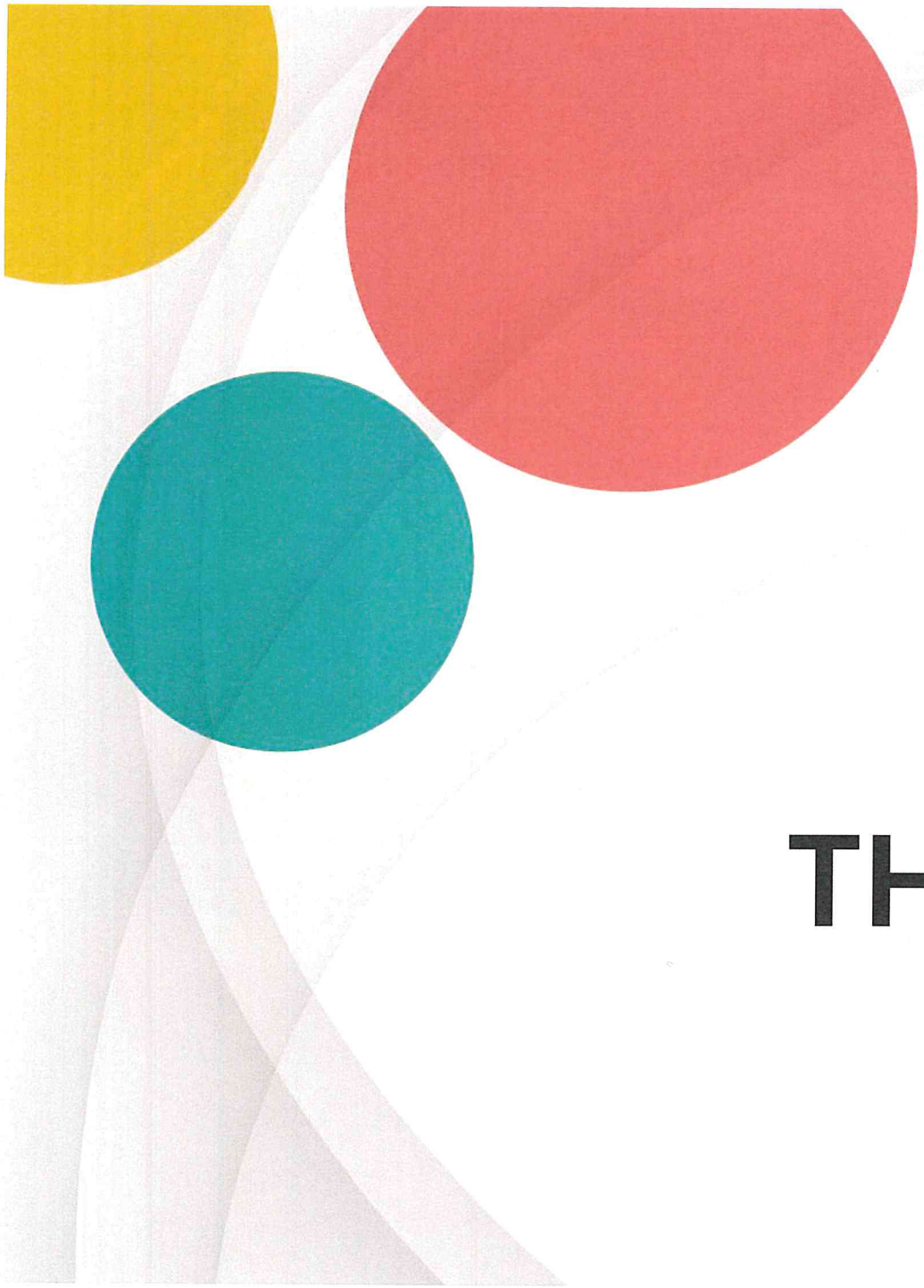
Treatment of pectoral muscle hypertonia using Botox®

· **Endpoint (2)**

- At 12 weeks after treatment, improvements in overall ROM(range of motion) were 82.9° in the BoNT-A-treated group versus 51.8° in the TA(triamcinolone acetonide) group (P=0.059).



Stroke. 2008 Jan;39(1) 126-31.



THANK YOU