Flexor Carpi Ulnaris Innervation Zone Localization using High-density Surface Electromyography

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The aim of this research is to determine whether HDsEMG could be used as a reliable alternative to a current clinical procedure of lower arm muscle innervation zone localization.

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Central nervous system vascular disorders
Study type	Observational non invasive

Summary

ID

NL-OMON34732

Source
ToetsingOnline

Brief title
FUSE

Condition

- Central nervous system vascular disorders

Synonym
hypertonia spasticity

Research involving
Human

Sponsors and support

Primary sponsor: Leids Universitair Medisch Centrum
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: FCU, flexor carpi ulnaris muscle, High-density surface EMG, innervation zone

Outcome measures

Primary outcome

If the innervation zone can indeed be reliably located using HDsEMG:

the distance [mm] between this location and the location as estimated using the

bony landmark method.

Secondary outcome

Variability in innervation zone location as a function of test condition, i.e.

of elbow and wrist joint angles, level of isometric contraction and stimulation

method (i.e. voluntary contraction on various levels of force, reflex induction

by an external stretching force, or electrical stimulation).

Study description

Background summary

Botulinum toxin A injections are increasingly applied to reduce abnormally high muscle tone in specific neurological disorders. Effective treatment requires application close to the muscle*s in-nervation zone. No standard procedure of innervation zone localization currently exists. Moreover, there is evidence for clinically relevant variation in innervation zone location, both between indi-viduals and as a function of muscle activation level but not of joint angle. High-density surface electromyography (HDsEMG) potentially offers a suitable method of innervation zone localization under various conditions.

The primary research question is whether it is possible to reliably localize the flexor carpi ulnaris muscle*s innervation zone using HDsEMG under various experimental conditions.

Study objective

The aim of this research is to determine whether HDsEMG could be used as a

reliable alternative to a current clinical procedure of lower arm muscle innervation zone localization.

Study design

The methodology will be developed and evaluated on a cohort of 10 healthy adults. In both arms, the innervation zone of the flexor carpi ulnaris muscle will be determined using HDsEMG. Motor unit potentials will be measured during three types of muscle activation: voluntary contraction, mechanically induced stretch reflex and electrical stimulation of the ulnar nerve. Innervation zone location will be compared to a method based on bony landmarks. Reliability will be assessed by repeated measures. Innervation zone location dependency on muscle activation level, joint angle and method of muscle stimulation will be assessed.

Study burden and risks

Electromyography is performed using a galvanically separated system that poses no threat to the subject at all. The wrist movements imposes on the subject are of minor amplitude and could theoretically result in some lower arm muscle pain. Electrical stimulation of the ulnar nerve may result in a momentary unpleasant or even slightly painful sensation.

This research could contribute to more effective ways of botulin toxin application to lower arm muscles that cause less inconvenience to the patient. Subjects participating in this research are not at risk of anything but minor inconvenience and time investment.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

healthy adult volunteers, matched to the group of patients regularly seen at the LUMC Rehabilitation Department*s outpatient botulinum toxin injection treatment

Exclusion criteria

conditions that may influence voluntary control or mechanical properties of one or both flexor carpi ulnaris muscles, e.g.:
central neurological pathology;
peripheral neurological pathology affecting one or both upper extremities;
past fracture of lower arm, wrist or carpals;
active lower arm tendinopathy.

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Treatment

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	22-04-2011
Enrollment:	10
Type:	Actual

Ethics review

Approved WMO

Date:	06-08-2010
Application type:	First submission
Review commission:	METC Leids Universitair Medisch Centrum (Leiden)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL31848.058.10