

Muscle activation of abnormal coupling of shoulder and elbow torques during reaching after stroke

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

Summary

ID

NL-OMON30163

Source

ToetsingOnline

Brief title

Muscle activation during synergistic arm movements after stroke

Condition

- Central nervous system vascular disorders

Synonym

cerebrovascular accident, stroke

Research involving

Human

Sponsors and support

Primary sponsor: Revalidatiecentrum Het Roessingh

Source(s) of monetary or material Support: subsidie door SenterNovem

Intervention

Keyword: muscle activity, stroke, surface EMG, upper extremity

Outcome measures

Primary outcome

The intensity of activation of 8 shoulder and elbow muscles is measured (by surface EMG), to quantify movement control, along with kinematic parameters (such as velocity and smoothness of movement), to quantify movement execution.

Secondary outcome

(not applicable)

Study description

Background summary

Arm function is often limited after stroke. Research has indicated that abnormal, involuntary coupling between shoulder and elbow torques is involved. Additionally, a proposed theory stated that in each stroke patient a threshold exists, above which abnormal coupling (i.e. synergy) is expressed, related to the extent of exertion. However, the expression of these abnormal synergies in muscle activity and the existence of an intensity-related threshold is not known yet. Furthermore, not much knowledge exists about the behaviour of these synergies with different velocities of movement. Information about these underlying muscle activation will provide a better insight in movement control after stroke, which may offer points of impact for new applications in rehabilitation for recovery of arm function after stroke.

Study objective

The objectives of this experiment are twofold. First, the muscle activation pattern related to a synergistic movement during reach is investigated, with attention for the existence of a threshold of amount of exertion above which an abnormal synergy manifests. Second, the relationship between iso-metric and iso-kinetic movement executions is determined.

Study design

Muscle activation during a synergistic movement is compared with a movement without coupling in a cross-sectional experiment of repeated movements. The synergy is provoked by providing resistance against shoulder abduction, during a reaching movement laterally and upward to shoulder height, with 4 different intensities of resistance (with a maximum of 60% of the individually generated maximal torque).

Additionally, isokinetic elbow extensions (at 4 different speeds) are compared to isometric performance. This is repeated 7 times, in which the amount of generated shoulder abduction is varied in equal steps from 0 to 200% of the weight of the arm.

Study burden and risks

The risks for the subject are limited to a minimum, since the movement tasks represent functional and familiar arm movements and are performed only within the scope of the subject's ability. Furthermore, the Dampace device can never provoke movements outside the subject's range of motion, since it can only resist movement that is generated by the subject and can not move the arm of the subject on its own.

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

For both stroke patients and healthy subjects:

- Aged between 25 and 75 years

For stroke patients only:

- Stroke at least 6 months prior to admittance to experiment

- Right upper extremity affected (due to experimental set-up only for right arm)

- Score of 0 or 1 on item AIII-2 of Fugl-Meyer assessment:

= anteflexion of the arm from 0° to 90° with full extension of the elbow and the lower arm midway between pro-/supination; performance must be without elbow flexion immediately at the start of movement

- Having (received) treatment at the Roessingh Centre of Rehabilitation

Exclusion criteria

For both patients and healthy volunteers:

- Shoulder pain, either in rest or in movement

- Additional neurologic, orthopaedic or rheumatologic disease of right upper extremity, likely to interfere with mobility and/or strength of the arm

- Inability to understand and follow instructions

Study design

Design

Study type: Observational non invasive

Masking: Open (masking not used)

Control: Uncontrolled

Primary purpose: Other

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	12-12-2006
Enrollment:	20
Type:	Actual

Ethics review

Approved WMO	
Date:	13-06-2006
Application type:	First submission
Review commission:	METC Twente (Enschede)

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	NL12726.080.06