Functional properties of spastic muscles and isolated muscle fibers

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To what extent does the resistance to stretch of spastic muscles differ from that of non-spastic ones?Does tendon transfer affect a muscle*s functional capacity?

Ethical review	Approved WMO
Status	Pending
Health condition type	Musculoskeletal and connective tissue disorders congenital
Study type	Observational invasive

Summary

ID

NL-OMON30211

Source
ToetsingOnline

Brief title
spastic muscle properties

Condition

- Musculoskeletal and connective tissue disorders congenital
- Soft tissue therapeutic procedures

Synonym
cerebral palsy, spasticity

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: Phelps stichting voor spastici

Intervention

Keyword: biomechanics, force, spastic muscles

Outcome measures

Primary outcome

stiffness (elastic module)

length-force characteristics

Secondary outcome

na

Study description

Background summary

Surgery of the upper extremity in cerebral palsy is aimed at improving the range of motion of the affected joints and, if present, the correction of joint instability. However, the result of treatment varies and the functional outcome for the patient is unpredictable. A variety of procedures is available and during surgery a surgeon is confronted with dilemmas concerning what muscle to transfer, how the muscle should be mobilized, which route it should take, and at what tension it should be inserted, considering the individual needs of the patient. There is not an evidence-based answer to, nor consensus on any of these questions. Knowledge of the biomechanics of tendon transfer and on the behavior of spastic muscle is imperative for appropriate surgical planning to meet the requirements of an optimal muscle balance, and to optimize treatment. Little is known of the mechanical properties of spastic muscles and there is discussion as to whetherspastic muscles differ from healthy ones
Previous study has shown that the intra-, inter-, en extramuscular connective tissue may be of functional significance. There is an indication that the connective tissues within spastic muscles is different from that of healthy ones.

Study objective

To what extent does the resistance to stretch of spastic muscles differ from that of non-spastic ones?
Does tendon transfer affect a muscle*s functional capacity?

Study design

1. harvesting of intra-operatively obtained muscle biopsies of both spastic (n=20) and healthy (n=20) human FCU (3mm X 5 mm), at the AMC. The biopsies are coded, subsequently kept, and stored in a relax-solution containing 50% glycerine.
Mechanical testing of isometric passive and active length-force characteristics of both isolated muscle fibers with and without their thin layer of directly adjacent connective tissue matrix (endomysium) and small bundles of muscle fibers including endo-, and the connective tissue that surrounds the bundle of muscle fibers (perimysium) of the biopsies, directly after stretch, after 4 minutes at a kept length, and at relaxation to a standardized length.

2. Of the spastic FCU only, active and passive length-force characteristics are measured during several stages of surgery.

Study burden and risks

The burden and risks for the patients are small; In the spastic muscle group the operation will take 30 minutes longer because of the intraoperative measurements of length-force characteristics by percuteneous electrical stimulation of the ulnar nerve, while the patient is anaestetized.
Of both groups of patients, a small biopsy is taken (3 mm by 5 mm) of the most distal part of the flexor carpi ulnaris muscle. Risks are minimal.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)
Adolescents (16-17 years)
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

p: a spastic flexor carpi ulnaris muscle
c: a healthy flexor carpi ulnaris muscle

Exclusion criteria

na

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-06-2006

Enrollment:	40
Type:	Anticipated

Ethics review

Approved WMO Application type:	First submission
Review commission:	METC Amsterdam UMC

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	NL11239.018.06