Muscle activation patterns of the supraspinatus and deltoid muscle in abduction of the arm: Motion generator or GH (de)stabilizator?

No registrations found.

Ethical review	Positive opinion
Status	Recruiting
Health condition type	-
Study type	Observational non invasive

Summary

ID

NL-OMON19914

Source
NTR

Brief title
MAPSAD

Health condition

Observational study in healthy subjects, to learn more about patients with rotator cuff disease.

Sponsors and support

Primary sponsor: Leiden University Medical Center
Source(s) of monetary or material Support: ZonMW
Reumafonds

Intervention

Outcome measures

Primary outcome

External force controlled Electromyography (EMG).

To measure activation of individual shoulder muscles (in particular: deltoids, supraspinate, infraspinate, pectoralis major, upper and lower trapezius, latissimus dorsi and teres major) and analyze for relative changes in activation of rotator cuff and deltoid muscles with increased arm moment loading.

Conditions: Arm against an external force in 24 directions (humerus fixed in splint, constant exerted abduction force), 2 moment arms (~4 cm and ~29 cm from the glenohumeral joint).

Outcome: Average filtered EMG value (rEMG), principal Action (PA), Activation Ratio (AR) and Max Voluntary Force (MVF), relative change in deltoid and supraspinate activation (rEMG) expressed in percentages.

Secondary outcome

3D-Motion tracking of the scapular position during arm force task with the humerus in a fixed position. To record 3D kinematics of the scapula with a motion tracking system for analyzing the eventual change in scapular position as a result from changes in muscle activations when altering moment loading (with a constant force).

Conditions: Arm against an external force (humerus fixed in a splint, constant exerted force), 2 moment arms (~4 cm and ~29 cm from the glenohumeral joint).

Outcome: 3D scapular positions (scapular posterior tilting, external rotation, and lateral rotation as described in literature) with altering moments and muscle activations.

Study description

Background summary

It is generally alleged that mobility in the glenohumeral joint is generated by muscles with relative large force moment arms, while stability in the glenohumeral joint is predominantly guarantied for by muscles close to the joint with relatively small moment arms: the rotator cuff muscles. Consequently, there is a lack of glenohumeral stability in patients with rotator cuff tears, with subsequent relative cranial translation of the humerus and pain. For abduction of the arm, the deltoid would be the main moment generator, with the rotator cuff muscles providing glenohumeral stability. Nevertheless, these beliefs have never been assessed by biomechanical analyses.
Arm motion (e.g. arm muscle forces and moments) and scapular position directly correlate, but it is not clear whether scapulohumoral rhythm has an essential and active role in facilitating arm motions, or if it is simply the result of muscle activations and intended arm motions. The cooperation of muscle activation patterns and scapular position needs to be studied, because distorted scapulohumoral or scapulo-thoracal rhythm is related to

subacromial pathologies.

Study objective

We hypothesize that, with increased arm abduction moment loading with a constant exerted abduction force, primary arm moment generators (deltoid muscle) will have a greater increase in activation (EMG) as compared to primary arm/glenohumeral stabilizators (supraspinate muscle).

Study design

Intake and measurements at 1 timepoint.

Intervention

Subjects will be seated, having their dominant arm fixed in a splint. Next, subjects will have to exert isometric forces in directions perpendicular to the long axis of the humerus, using visual feedback.

In a second session, the same approach will be applied, with the same exerted arm force. However, in the second session the exerted force will be applied at a point nearer to th GH-joint.

In this manner, subjects will participate in 2 sessions of measurements using the same exerted force. However, subjects will be subjected to 2 separate amounts of arm moment loading.

During the isometric force tasks, EMG will be recorded using surface electrodes.

Contacts

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Eligibility criteria

Inclusion criteria

1. Age: between 18 and 60 y.o.;

2. No history of shoulder complaints;

3. No current complaints of the shoulder.

Exclusion criteria

1. No signed informed consent;

2. Pace-maker or other electronic implants.

Study design

Design

Study type:	Observational non invasive
Intervention model:	Factorial
Allocation:	Non controlled trial
Masking:	Open (masking not used)
Control:	Active

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	25-02-2010
Enrollment:	23
Type:	Anticipated

Ethics review

Positive opinion

Date:	12-04-2010
Application type:	First submission

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
NTR-new	NL2160
NTR-old	NTR2284
Other	ZonMW : 40-00703-98-8564
ISRCTN	ISRCTN wordt niet meer aangevraagd.

Study results

Summary results
N/A