MRI and 3D imaging of the mimic musculature

Published: 12-04-2017
Last updated: 10-08-2024

This study has multiple purposes:Primary objective:1: to investigate whether it is possible to identify the small mimic muscles independently of each other and to determine the exact position of the mimic muscles from origin to insertion on MRI...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON45873

Source
ToetsingOnline

Brief title
MRI and 3D imaging of the mimic musculature

Condition

- Other condition

Synonym
mimic musculature

Health condition

geen aandoening, maar lokalisatie en beoordeling van het verloop en de functie van de mimische spieren

Research involving
Human

Sponsors and support

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

Intervention

Keyword: 3 Dimensional, face, facial expression, mimic musculature

Outcome measures

Primary outcome

1: correct identification of the mimic muscles would be considered to be possible if the average volume of mimic muscle measured on MRI images by three different investigators at three different times differ less than twenty percent.

Secondary outcome

2: correct standardization of the positions of the mimic muscles is considered to be possible if the average XYZ-coordinates, representing the origo and insertion of a mimic muscle, determined by three different investigators at three different times differ less than twenty percent.

3: correct superimposition is considered to be possible if the MRI images correspond with the images on the 3D photograph.

4: the movement of the face in centimetres when changing facial expressions. A change is defined as a deviation in position based on a XYZ-coordinate system.

5: the time in minutes a facial expression can be hold unchanged. A change is defined as a deviation in position on a XYZ-coordinate system of more than twenty percent.

The computer program 3DMD Vultus can be used to analyse three-dimensional images from MRI and 3D photographs. Identified anatomical landmarks will be registered as coordinates in a XYZ-coordinate system. Changes in corresponding coordinates can indicate a change in for example a position of a muscle or an ability to create facial expressions. A change in the direction of the X-axis corresponds with a movement in a horizontal direction, a change in the direction of the Y-axis corresponds with a movement in a vertical direction and a change in the direction of the Z-axis corresponds with a movement in ventro-dorsal direction. The computer program can also be used to analyse differences between images by superimposition.

Study description

Background summary

It is known that facial traumas can lead to changes in facial expressions. A disturbance in the normal anatomy might be the cause of this problem. A change in the location of the origo or insertion of a muscle can result in a change in the course of that muscle. As a result of this, the vector by which a muscle exerts its force will change, thereby also changing its function in facial expressions.

Also in case of elective surgery, some patients report the above-mentioned change in facial expressions even after complete healing. This change is most of the time unexpected and unpredicted and thereby unwanted by the patient as well as by the surgeon. This seems in particular to be the truth after a Le Fort 1 Osteotomy. Although these patients are convinced that their faces look more attractive after having the surgery done, they don*t appreciate the change in facial expressions. Especially a reduced ability to smile broadly, a very important way of non-verbal communication, seems to be the cause for disappointment. In severe cases it may even be that patients no longer recognize their own faces as a result of the changed facial expressions.

Placing back the mimic muscles to the correct anatomical site seems to be important in order to prevent the occurrence of any undesirable changes in

facial expressions after elective surgery and to pursue optimal restoration of natural muscle function in reconstructive surgery after trauma. Detailed knowledge about the exact position and the course of the mimic muscles from origin to insertion is therefore considered essential.

A lot of research has been done recently regarding the (change in) position (of parts) the facial skeleton after trauma and surgery by using three-dimensional imaging techniques and CT-scans. However, still very little is known about the mimic muscles of the face and their exact position and function.

The purpose of this research project is to learn all the details about the mimic muscles. The aim is to find out whether it is possible to identify all the small mimic muscles independently of each other (instead of identifying mimic muscles as a group) and to determine their exact anatomical position from origo to insertion to reveal their function based on their anatomical position by using MRI and three-dimensional imaging.

With the results of this research project reference values could be made regarding muscles positions and average excursions in facial expressions. These reference values could be helpful to place back the muscles to their original anatomic site during surgery in order to preserve or restore the facial expressions of the patient in the best possible way and to quantify the changes in facial expressions after trauma or surgery.

Study objective

This study has multiple purposes:

Primary objective:
1: to investigate whether it is possible to identify the small mimic muscles independently of each other and to determine the exact position of the mimic muscles from origin to insertion on MRI images, thereby defining the course of these muscles and revealing their functions in facial expression.

Secondary objectives:
2: to investigate whether it is possible to standardize the positions of the mimic muscles of the face using on MRI images and a XYZ-coordinate system.
3: to investigate whether it is possible to superimpose MRI images and 3D photographs using the computer program 3DMD Vultus, thereby trying to connect the course of a muscle with the facial expression to reveal the function of a muscle.
4: to determine the average excursions in facial expressions.
5: to determine the duration a volunteer can hold a certain facial expression unchanged.

Study design

Feasibility study

Study burden and risks

There are no risks for healthy volunteers associated with participation in this study. The extend of the burden is minimal, there will only be a time investment of approximately 30 minutes.

Contacts

Public
Universitair Medisch Centrum Utrecht

Heidelberglaan 100
Utrecht 3584 CX
NL
Scientific
Universitair Medisch Centrum Utrecht

Heidelberglaan 100
Utrecht 3584 CX
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

age between 18 and 40 years

Exclusion criteria

surgery or trauma to the face or orthodontic treatment in the past
claustrophobia
physically or mentally incapable for MRI

Study design

Design

Study type: Observational non invasive

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	20-05-2017
Enrollment:	10
Type:	Actual

Ethics review

Approved WMO

Date:	12-04-2017
Application type:	First submission
Review commission:	METC NedMec

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	NL57925.041.16