Beweging van een zenuw in de arm tijdens nek-bewegingen bij patiënten met een nekhernia en bij gezonde proefpersonen

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During a contra-lateral cervical lateral glide mobilization technique, the median nerve longitudinally moves at the sites of the elbow and/or the wrist and there is a notable difference between patients and healthy controls.

Ethische beoordeling	Positief advies
Status	Werving gestopt
Type aandoening	-
Onderzoekstype	Observationeel onderzoek, zonder invasieve metingen

Samenvatting

ID

NL-OMON22549

Bron
NTR

Aandoening

Cervical radiculopathy; radiating arm pain; neck pain; radicular pain
Nek hernia; uitstralende arm pijn ; radiculaire arm pijn; nek pijn

Ondersteuning

Primaire sponsor: Fysio-Experts, Research department
Overige ondersteuning: Fysio-Experts = initiator = sponsor

Onderzoeksproduct en/of interventie

Uitkomstmaten

Primaire uitkomstmaten

We will report the degrees of contralateral cervical movement in combination with the excursions (in millimeters) of the median nerve at the wrist and the the elbow.
We will also report the correlation between the degrees of contralateral cervical movement with the millimeters excursions of the median nerve at the wrist and elbow in both healthy controls and patients with cervical radiculopathy.
Comparison of nerve excursions between patients with cervical radiculopathy and asymptomatic subjects.

Toelichting onderzoek

Achtergrond van het onderzoek

Cervical radiculopathy (CR) is a clinical condition whereby motor, reflex and/or sensory changes (such as paraesthesiae or numbness) can present, often provoked by neck posture(s) and/or movement(s) (Kuijper et al. 2009, Thoomes et al. 2012) . Radiculopathy is differentiated from radicular pain, where radiculopathy is a neurological state in which conduction is impaired along a spinal nerve or its roots (Merskey H 1994, Bogduk 2009, Bogduk 2011, Smart et al. 2012) . Although radiculopathy and radicular pain commonly occur together, radiculopathy is not defined by pain alone but also by neurological signs (Bogduk 2009, Bogduk 2011) .

Sparse epidemiological data for CR reports an age-corrected incidence of 83.2 per 100.000 persons (107.3 for males en 63.5 for females) with a peak incidence at 50-59 years (Radhakrishnan et al. 1994). Another study reported a prevalence of 3.5 per 1000 people and a peak annual incidence of 2.1 cases per 1000 people (Salemi et al. 1996) .

The most often reported cause of CR is compression of the nerve root in the interforaminal space, most commonly due to either loss of height of the disc or degenerative spondylotic changes or both (Radhakrishnan et al. 1994) . Other causes like

tumors, infections or avulsion fractures are rare (Radhakrishnan et al. 1994) . A recent study examining the prevalence of cervical nerve root compression, as seen with Magnetic Resonance Imaging (MRI) in 78 patients with acute onset CR, reported compression due to a herniated cervical intervertebral disc in 35-41%, foraminal spondylotic changes in 22-36% and a combination of both in 10-28% of cases (Kuijper et al. 2011) . The C6 (66%) and C7 (62%) nerve roots are most often afflicted (Kim et al. 2016) .

Little is known about the natural course of CR. A recent systematic review on CR due to disc compression reported a substantial improvement in the first 4 to 6 months and a time to complete recovery ranging from 24 to 36 months in approximately 83% of patients (Wong et al. 2014) .

Conservative management is preferred above surgery, as surgery is not superior and the risk benefit ratio seems to be less preferable (Nikolaidis et al. 2010, Peolsson et al. 2013) . Also, some 29% of surgically managed patients with CR are rescheduled for surgery of an adjacent level within one year (Bono et al. 2011, van Middelkoop et al. 2013) . Several reviews assessed the effectiveness of conservative management in patients with CR (Bono et al. 2011, Salt et al. 2011, Thoomes et al. 2013) . There is low level evidence for the effectiveness of conservative management for the level of pain for multimodal interventions with a neurodynamic intent (including neurodynamic mobilization (NM)), combined with joint and muscle mobilizations (Basson et al. 2015, Thoomes 2016, Ballestero-Perez et al. 2017, Basson et al. 2017) .

Hypotheses about the working mechanisms of NM have evolved. From the inception in the early 1960’s, a biomechanical model was most prevalent (Breig 1960, Butler 1991, Kleinrensink et al. 1995, Kleinrensink et al. 2000, Shacklock 2005, Coppieters and Butler 2008, Coppieters et al. 2009) . NM was thought to improve nerve movement and/or other biomechanical properties such as strain, stiffness etc., resulting in the use of “nerve stretching exercises” until well in the early 2000’ (Jepsen and Thomsen

2008) . Recently theoretical models concerning the underlying mechanisms of NM have moved to include restoration of homeostasis in and around the nerve and reducing intraneural edema through intraneural fluid dispersion in the nerve root and axon (Gilbert et al. 2015, Gilbert et al. 2015, Basson et al. 2017, Boudier-Reveret et al. 2017) . For example, theories regarding fluid dispersion rely on the thixotrophic properties of nerve movement against its mechanical interface. Therefore, the improved fluid mechanics are dependent on nerve movement (Brown et al. 2011, Gilbert et al. 2015, Boudier-Reveret et al. 2017) .

Ultrasound imaging (USI) is increasingly being used by healthcare practitioners in the assessment of movement dysfunctions (Plagou et al. 2016) . It is also gaining popularity as a tool for assessing nerve excursion and is becoming an important tool for the assessment during conservative management of entrapment neuropathies (Kasehagen et al. 2018) . Several researchers have assessed longitudinal and transverse excursion of peripheral nerves using USI, in asymptomatic subjects and also in patients with carpal tunnel syndrome (Nee et al. 2010, Coppieters et al. 2015, Meng et al. 2015, Ridehalgh et al. 2015, Kasehagen et al. 2016, Ellis et al. 2017, Kasehagen et al. 2018) .

A segmental contra-lateral cervical lateral glide (CCLG) mobilization technique of the cervical spine has shown to be effective in patients with nerve-related neck and arm pain (Coppieters et al. 2003, Basson et al. 2017) . The CCLG mobilization technique is part of a contemporary evidence based conservative treatment regime in patients with CR, which also includes active and passive exercises aimed at restoring optimal neuromusculoskeletal mobility as well as local and global muscular control and endurance of the cervical and thoracic spine (Leininger et al. 2011, Salt et al. 2011, Thoomes et al. 2013, Thoomes 2016, Kjaer et al. 2017) . The neurodynamic intent in this technique is to mobilize the nerve in relation to non-neural structures surrounding the nerve root (e.g. muscle, tendon, fascia and bone: i.e. the “mechanical interface”) (Hall and Elvey 1999, Tillett et al. 2004) .

It has been shown that a CCLG technique will result in median nerve excursions in both the wrist and the elbow in healthy individuals (Brochwicz et al. 2013) . Similar longitudinal median nerve excursions in the wrist have been documented during inspiration and cervical side flexion (Dilley et al. 2003, Greening et al. 2005) . To date, longitudinal nerve excursions during a CCLG have not been assessed in patients with CR. It would be of interest to assess if there is a difference in median nerve movement between patients and healthy individuals. Furthermore, if nerve excursion are diminished in patients with CR, it would be if interest to establish if nerve excursions change in response to conservative treatments, such as NM, as the symptoms of CR decrease. To our knowledge this has also not yet been assessed previously and this information could potentially assist in a choice of therapeutic intervention.

We hypothesize that peripheral nerve excursions are not significantly diminished in patients with CR compared to healthy controls. This would assist in lending more credibility to underpinning therapeutic efficacy of the CCLG through diminishing intraneural edema and restoring local neural homeostasis of the nerve root (Gilbert et al. 2015, Gilbert et al. 2015, Basson et al. 2017, Boudier-Reveret et al. 2017) .

Therefore the aim of this study is to assess longitudinal excursions of the median nerve in asymptomatic subjects and patients with CR during a mechanically induced CCLG movement of the cervical spine. A secondary aim is to reassess this at a 3 month follow-up in patients with CR and correlate this with the progression of signs and symptoms.

Doel van het onderzoek

During a contra-lateral cervical lateral glide mobilization technique, the median nerve longitudinally moves at the sites of the elbow and/or the wrist and there is a notable difference between patients and healthy controls.

Onderzoeksopzet

T0: intake

T1: 12 weeks

Onderzoeksproduct en/of interventie

A contra-lateral cervical lateral glide (CCLG)
mobilisation technique will be performed by a
computerized treatment plinth; the Occiflex.
during this CCLG, the longitudinal excursions of
the median nerve will be assessed at the wrist and elbow , using ultrasound imaging (USI).

Contactpersonen

Publiek

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Deelname eisen

Belangrijkste voorwaarden om deel te mogen nemen

(Inclusiecriteria)

Patients with radiating radicular arm pain and an initial diagnosis of CR based on consistent signs and symptoms from the patient subjective history (radiating pain in the arm and peri-scapular region with either motor, reflex and/or sensory changes such as paraesthesiae or numbness) and results from a set of valid provocative tests (Spurling’s, Arm Squeeze test, traction-distraction test, Shoulder abduction relief and Upper Limb Neural tests. When possible, the diagnosis will be confirmed by diagnostic imaging through MRI or CT-myelography. The asymptomatic subjects are defined as otherwise deemed healthy subjects not to have had radiating pain in the arm or neck pain in the previous 12 months.

Belangrijkste redenen om niet deel te kunnen nemen (Exclusiecriteria)

Patients will be excluded in the presence of chronic diseases, intellectual or physical disabilities making them unable to understand and adhere to the research protocol, organ failure and other serious medical conditions (systemic inflammations or disorders e.g. diabetes, tumors, etc.).

Participants will also be excluded if they have a neurological condition or other systemic disorders (e.g. diabetes) that might alter the function of the nervous system or if they have a history of major trauma or surgery to the cervico-thoracic region.

Onderzoeksopzet

Opzet

Type: Observationeel onderzoek, zonder invasieve metingen

Onderzoeksmodel:	Anders
Toewijzing:	N.v.t. / één studie arm

Controle: N.v.t. / onbekend

Deelname

Nederland

Status:	Werving gestopt
(Verwachte) startdatum:	01-09-2018
Aantal proefpersonen:	40
Type:	Werkelijke startdatum

Voornemen beschikbaar stellen Individuele Patiënten Data (IPD)

Wordt de data na het onderzoek gedeeld: Nog niet bepaald

Ethische beoordeling

Positief advies

Datum:	06-09-2018
Soort:	Eerste indiening

Registraties

Opgevolgd door onderstaande (mogelijk meer actuele) registratie

Geen registraties gevonden.

Andere (mogelijk minder actuele) registraties in dit register

Geen registraties gevonden.

In overige registers

Register	ID
NTR-new	NL7251
NTR-old	NTR7458

Register	ID
Ander register	METC Erasmus MC : MEC-2018-139

Resultaten

Samenvatting resultaten

Relevant references from the project group:

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5. Dilley, A., J. Greening, B. Lynn, R. Leary and V. Morris (2001). "The use of cross-correlation analysis between high-frequency ultrasound images to measure longitudinal median nerve movement." Ultrasound Med Biol 27(9): 1211-1218.
6. Dilley, A., B. Lynn, J. Greening and N. DeLeon (2003). "Quantitative in vivo studies of median nerve sliding in response to wrist, elbow, shoulder and neck movements." Clin Biomech (Bristol, Avon) 18(10): 899-907.
7. Ellis, R., S. Osborne, J. Whitfield, P. Parmar and W. Hing (2017). "The effect of spinal position on sciatic nerve excursion during seated neural mobilisation exercises: an in vivo study using ultrasound imaging." J Man Manip Ther 25(2): 98-105.