Journal of Bodywork & Movement Therapies 21 (2017) 810–814

Contents lists available at ScienceDirect

Journal of Bodywork & Movement Therapies

journal homepage: www.elsevier.com/jbmt

ORIGINAL RESEARCH

Comparison of acute effects of superficial and deep dry needling into trigger points of suboccipital and upper trapezius muscles in patients with cervicogenic headache

Asefeh Sedighi*, Noureddin Nakhostin Ansari, Soofia Naghdi

Department of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Article history:
Received 7 August 2016
Received in revised form
6 December 2016
Accepted 23 December 2016

Keywords:
Cervicogenic headache
Trigger point
Dry needling

ABSTRACT

Objective: The purpose of this study was to compare the acute effects of superficial and deep dry needling into trigger points of suboccipital and upper trapezius muscles in patients with cervicogenic headache.

Methods: Thirty participants (8 men, 22 women) aged 19–60 years (mean age ± SD, 39 ± 10 y) with a clinical diagnosis of cervicogenic headache were randomly divided into superficial and deep groups. Headache index, trigger points tenderness, cervical range of motion (CROM), functional rating index was assessed at baseline, immediate and 1 week after the treatment.

Results: Two approaches of dry needling showed reduction in headache index and trigger points tenderness. Deep dry needling showed greater improvement of cervical range of motion ($p < 0.001$) and functional rating index ($p < 0.01$).

Conclusion: The application of dry needling into trigger points of suboccipital and upper trapezius muscles induces significant improvement of headache index, trigger points tenderness, functional rating index and range of motion in patients with cervicogenic headache. Deep dry needling had greater effects on CROM and function.

1. Introduction

Headaches are a common condition affecting 47% of the global population (Racicki et al., 2013), with cervicogenic headaches (CeH) accounting for 15–20% of all chronic and recurrent headaches. CeH affect 2.2–2.5% of the adult population and appear to affect women four times more than men (Racicki et al., 2013). The International Headache Society (IHS) has classified a CeH as a secondary headache with 'pain referred from a source in the neck and perceived in one or more regions of the head and/or face'. This classification has also described the pain as being unilateral or bilateral, affecting the head or face but has most commonly affected the occipital region, frontal region, or retro-orbital region (Headache Classification Committee of the International Headache Society, 1988; Sjaastad et al., 1990; Sjaastad and Fredriksen, 2000; Headache Classification Subcommittee of the International Society, 2004). It is characterized by unilateral headache with symptoms and signs of neck involvement, for example, pain by movement, by external pressure over the upper cervical, and/or sustained awkward head positions (Headache Classification Committee of the International Headache Society, 1988; Sjaastad et al., 1990; Sjaastad and Fredriksen, 2000).

The physiologic basis of CeH pain lies in the convergence between trigeminal afferents and afferents from the upper cervical spinal nerves in the trigeminocervical nucleus caudalis (Chaibi and Russell, 2012; Bogduk, 2009; Biondi, 2001). Another convergence of sensorimotor fibers has been described involving intercommunication between the spinal accessory nerve (CN XI), the upper cervical nerve roots, and ultimately the descending tract of the trigeminal nerve. This neural network may be the basis for the well-recognized patterns of referred pain from the trapezius and sternocleidomastoid muscles to the face and head (Biondi, 2001). Therefore, therapeutic intervention targeted to tissues innervated by trigeminocervical nucleus can be effective for the management of individuals with CeH. The role of referred pain to the head elicited by muscle tissues been described in medical literature

* Corresponding author. Department of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences, Enghelab Ave, Pitch-e-shemiran, 11489, Iran. Tel.: +98 21 7753 3939 (office); fax: +98 21 77534133.
E-mail address: sedighi.pt@gmail.com (A. Sedighi).

http://dx.doi.org/10.1016/j.jbmt.2017.01.002
1360-8592/

received particular interest in recent years (Bogduk, 1992). It has been hypothesized that muscle trigger points (TrPs) can play a relevant role in the genesis of headache (Fernández-de-las-Peñas et al., 2007; Fernández-de-las-Peñas and Schoenen, 2009). A TrP is usually defined as a hyperirritable spot within a taut band of a skeletal muscle that elicits a referred pain upon examination (Simons et al., 1999). From a clinical viewpoint, TrPs can be classified as active or latent. Active TrPs are those which local and referred pain reproduces the pain symptoms, for example, reproduce the headache pattern (Simons et al., 1999). Trigger points have been reported to be present in patients with tension type headache (Fernández-de-las-Peñas et al., 2007), migraine ((Fernández-de-las-Peñas et al., 2006), and cluster headache (Calandre et al., 2008). In addition, active TrPs have been also related to neck pain (De-la-Llave-Rincon et al., 2012; Muñoz-Muñoz et al., 2012). Although data related to trigger points in CeH are scarce, but Pfaffenrath et al. state that a characteristic feature of CeH is the "so-called trigger point, which presents as a circumscribed hypersensitive skin and muscle spot with a reduced pain threshold" (Pfaffenrath et al., 1987), While Sjaastad et al. have observed that the symptoms of CeH may be precipitated by firm manual pressure on "certain tender spots in the neck" (Sjaastad et al., 1990). There was a statistically significant difference between the incidence of tightness in the CeH group compared to the migraine and control groups for the upper trapezius ($P < 0.01$), levator scapulae ($P < 0.001$), scalenes ($P < 0.001$) and the suboccipital extensors ($P < 0.05$) but not for the pectoral muscles (Zito and Jull, 2006).

Physiotherapists use trigger point dry needling (TrP-DN) as an invasive treatment where a solid filament needle is inserted into a myofascial trigger point (MTrP). The advantages of DN are increasingly documented (Affaitati et al., 2011), and include an immediate reduction in local, referred, and widespread pain (Affaitati et al., 2011; Fernandez-Carnero et al., 2010; Hsieh et al., 2007), restoration of range of motion and muscle activation patterns (Affaitati et al., 2011; Lucas et al., 2010), and a normalization of the immediate chemical environment of active myofascial trigger points (Shah et al., 2008). Dry needling can reduce peripheral and central sensitization (Fernandez-Carnero et al., 2010).

A superficial (SDN) and a deep (DDN) technique have been developed, whereby proponents of superficial needling suggest that the intervention targets primarily peripheral sensory afferents, while deep trigger point dry needling targets mostly dysfunctional motor units (Baldry, 2005).

Physical therapy is commonly used for the management of individuals with CeH (Pollmann et al., 1997). Previous systematic reviews reported preliminary evidence for the application of upper cervical spine mobilization or manipulation for the management of CeH (Bryans et al., 2011; Vernon et al., 1999; Fernández-de-las-Peñas et al., 2005). A recent systematic review of manual therapies suggests that spinal manipulation might be an effective treatment in the management of CeH patients (Chaibi and Russell, 2012).

No studies to date have examined the effectiveness of dry needling into suboccipital and upper trapezius muscles in patients with CeH exhibiting active TrPs in these muscles.

2. Methods

2.1. Participants

Thirty participants (8 men, 22 women) aged 19–60 years (mean age ± SD, 39 ± 10 y) with CeH eligible for the study were invited to participate.18 patients had left and 12 patients had right unilateral headache. This study was approved by the Ethical Research Committee of Tehran University of Medical Sciences. They had to present a diagnosis of CeH according to the criteria of Sjaastad and Fredriksen (Sjaastad and Fredriksen, 2000): (1) unilateral pain starting in the neck and radiating to the frontotemporal region, (2) pain aggravated by neck movement, (3) restricted cervical range of motion (CROM), (4) joint tenderness in at least one of the joints of the upper cervical spine (C1-C3), and (5) headache frequency of at least 1 per week over a period greater than 3 months. These criteria demonstrated moderate to good reliability (Van Suijlekom et al., 1999). In addition, participants had to be between 18 and 60 years of age and to present active and latent TrPs in the suboccipital and upper trapezius muscles reproducing their headache. All patients had only used analgesics for headache treatment in the past and were not allowed to use any analgesic drugs during the study.

Participants were excluded from this study if they had (1) a history of neck trauma; (2) cervical radiculopathy; (3) previously had surgery in the neck or shoulder area; (4) a history of diagnosed primary headache; (5) trigger point therapy or TrP-DN in the neck within the previous 6 months; (6) evidence of cognitive deficits; or (7) needle phobia; (8) subjects $\geq 65y$ due to vascular defects.

2.2. Outcome measures

A series of headache-associated measures and physical tests of the cervical spine were assessed at baseline, immediately and 1 week after treatment.

A headache index (HI) was calculated for each patient, from the statements in the headache diary, by multiplying the headache intensity and the days with headache (Karakurum et al., 2001). Muscle tenderness was assessed by palpating the neck muscles using 4° rating scale described below. Neck ROM was assessed as degree of restriction during flexion, extension, lateral flexion to the right and left, rotation to the right and left. The following rating scales were used for assessment:

Pain intensity: 0 = no pain; 1 = mild pain; 2 = medium pain; 3 = intense pain; 4 = severe pain (Karakurum et al., 2001).

Trigger-point tenderness: 0 = no report of pain and no visible reactions; 1 = report of tenderness but no visible reaction; 2 = report of painful tenderness and visible reaction by face and mimics; 3 = report of severe pain and marked visible reaction or avoidance (Karakurum et al., 2001).

ROM: 0 = no restriction; 1 = minimal restriction (35 ± 45°); 2 = medium restriction (20 ± 35°); 3 = marked restriction (less than 20°) (Karakurum et al., 2001).

Function was evaluated using the Persian version of the Functional rating index-questionnaire (FRI) at baseline and 1 week after treatment. The Functional Rating Index (FRI) is a self-report questionnaire that can be used for patients with back pain or NP (Nakhostin Ansari et al., 2012). The FRI scores ranged from 0% to 100% (no disability to severe disability).

Patients were allocated by chance into either DDN group or the SDN group. All patients in DDN group received needle insertions into suboccipital and upper trapezius trigger points previously described by Dommerholt (Dommerholt and Fernandez-de-Las-Penas, 2013: pp 73–92) (see Figs. 1 and 2). In SDN group needles were inserted only subcutaneously on trigger points. The needles were left inserted in the muscles for 15 min in both groups. The patients in both groups were treated one session. Post-treatment evaluation was carried out immediately and at 1 week after treatment.

The data were analyzed by using the student's t-test, paired *t*-test, Freidman test, Wilcoxon test, ANOVA repeated measure test.

3. Results

Thirty subjects with CeH were screened for possible eligibility