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Contribution of Myofascial Trigger Points to Migraine Symptoms

Maria Adele Giamberardino, Emmanuele Tafuri, Antonella Savini, Alessandra Fabrizio, Giannapia Affaitati, Rosanna Lerza, Livio Di Ianni, Domenico Lapenna, and Andrea Mezzetti

Headache Center, Department of Medicine and Science of Aging, "G. D'Annunzio" University; Ce.S.I., "G. D'Annunzio" Foundation, Chieti, Italy.

Abstract: This study evaluated the contribution of myofascial trigger points (TrPs) to migraine pain. Seventy-eight migraine patients with cervical active TrPs whose referred areas (RAs) coincided with migraine sites (frontal/temporal) underwent electrical pain threshold measurement in skin, subcutis, and muscle in TrPs and RAs at baseline and after 3, 10, 30, and 60 days; migraine pain assessment (number and intensity of attacks) for 60 days before and 60 days after study start. Fifty-four patients (group 1) underwent TrP anesthetic infiltration on the 3rd, 10th, 30th, and 60th day (after threshold measurement); 24 (group 2) received no treatment. Twenty normal subjects underwent threshold measurements in the same sites and time points as patients. At baseline, all patients showed lower than normal thresholds in TrPs and RAs in all tissues ($P < .001$). During treatment in group 1, all thresholds increased progressively in TrPs and RAs ($P < .0001$), with sensory normalization of skin/subcutis in RAs at the end of treatment; migraine pain decreased ($P < .001$). Threshold increase in RAs and migraine reduction correlated linearly ($.0001 < P < .006$). In group 2 and normal subjects, no changes occurred. Cervical TrPs with referred areas in migraine sites thus contribute substantially to migraine symptoms, the peripheral nociceptive input from TrPs probably enhancing the sensitization level of central sensory neurons.

***Perspective:** This article shows the beneficial effects of local therapy of active myofascial trigger points (TrPs) on migraine symptoms in patients in whom migraine sites coincide with the referred areas of the TrPs. These results suggest that migraine pain is often contributed to by myofascial inputs that enhance the level of central neuronal excitability.*

***Keywords:** Myofascial trigger points, migraine, pain thresholds, hyperalgesia.*

A myofascial pain syndrome (MPS) is the complex of sensory (regional pain and hyperalgesia), motor, and autonomic symptoms caused by an active myofascial trigger point (TrP). In turn, a TrP is a spot of exquisite tenderness in a muscle or its fascia, localized in a taut, palpable band of fibers. It mediates a local twitch response under snapping palpation and gives rise to pain, tenderness, autonomic phenomena, and dysfunction in an area (referred zone) usually remote from its site but specific and characteristic for each muscle.[3,8,9,27] Sensory testing (measurement of pain thresholds to electrical stimulation) reveals that TrPs are typical sites of superficial (skin/subcutis) and deep (muscle) hyperalgesia, whereas referred pain areas are sites of deep hyperalgesia, possibly also extended to superficial tissues when the triggers are particularly active.[28-30]

Trigger points are a frequent occurrence in every individual, due to a number of factors, among which microtraumatic events are particularly important.[26] In the cervico-cranial district of headache patients, TrPs are more frequent than in the normal population, probably due to an increase in microtraumatic events in muscles of this district due to incorrect posture/antalgic attitudes that these patients may have as a consequence of their frequent headache attacks.[27] Migraine patients in particular have been shown to present a significantly greater number of active myofascial trigger points in the cervical muscles, mostly ipsilateral to migraine headaches.[6] When the referred area of these TrPs coincides with the

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Address reprint requests to Dr. Maria Adele Giamberardino, via Carlo de Tocco n. 3, 66100 Chieti, Italy. E-mail: mag@unich.it
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site of migraine pain, which is often the case for many TrPs in cervical muscles, one can hypothesize that the TrPs contribute, at least in part, to the triggering of the typical migraine attacks.[5,21] In such a situation, nociceptive inputs from TrPs in this location may produce continuous afferent bombardment of the trigeminal nerve nucleus caudalis and, thence, activation of the trigeminovascular system. Thus, active TrPs located ipsilateral to migraine headaches might be a contributing factor in the initiation or perpetuation of migraine.[6]

To test this hypothesis in patients with these characteristics, the present study evaluated the impact of specific treatment of cervical active trigger points on the subjective (pain attacks) and objective (sensory changes in painful areas) migraine pain symptoms. Preliminary results have already been published in abstract form.[13]

Materials and Methods

The study was divided into 2 phases.

Phase 1: Main Experiment

This was designed to assess the efficacy of TrP treatment with local anesthetic vs no treatment in patients [a true placebo treatment for TrP infiltration does not exist, as injection of saline or TrP penetration with a needle (dry needling) is a recognized effective therapy to TrP release][26] as compared with sensory assessment in normal subjects.

Patients and Subjects

Migraine patients without aura and normal subjects were considered for the study. Patients were all attending the Headache Center of the "G. D'Annunzio" University of Chieti. Normal subjects were chosen from the staff of the Department of Internal Medicine of the same University.

Inclusion criteria for patients to be subjected to active treatment (group 1) were an age range of 18 to 50 years and either sex, a history of migraine diagnosed by a specialist (according to 2004 IHS criteria)[16] at least a year before examination, a number of migraine attacks equal to or greater than 6 per month in the preceding 2 months, a negative history for any condition known to affect general pain sensitivity (eg, fibromyalgia, hypertension, diabetes),[7,14,23,28] the presence of active myofascial trigger points in muscles of the cervical region whose referred pain areas coincided with the typical sites of migraine attacks (detection of TrPs according to clinical criteria established by Simons et al),[25] the existence of intolerance and/or scarce responsiveness to classic migraine treatments, and a written informed consent to participate in the study.

Inclusion criteria for patients to be subjected to control evaluation (group 2) were an age range 18 to 50 years and both sexes, a history of migraine diagnosed by a specialist at least a year prior to examination,[16] a number of migraine attacks equal to or greater than 6 per month in the preceding 2 months, a negative history for any condition known to affect general pain sensitivity,[7,14,23,28] the presence of active myofascial trigger points in muscles of the cervical region whose referred pain areas coincided with the typical sites of migraine attacks,[25] the existence of intolerance and/or scarce responsiveness to classic migraine treatments and intolerance and/or allergy to local anaesthetics, and written informed consent to participate in the study.

Inclusion criteria for normal subjects were an age range 18 to 50 years and either sex, a negative history for migraine and any cervico-cranial pain, a negative history for any condition known to affect general pain sensitivity, a negative clinical examination for the presence of myofascial trigger points in the cervico-cranial region, and written, informed consent to participate in the study.

Fifty-four patients (group 1) meeting the inclusion criteria for active treatment were selected (43 women, 11 men, ages 23 to 46 years, mean age: 31.4 $\pm$ 5.8 SD) out of 115 examined. They were affected with unilateral frontal or temporal migraine (with no alternation of side) and presented TrPs in the sternocleidomastoid (n = 19), semispinalis cervicis (n = 23) or splenius cervicis (n = 12) muscles (referred pain areas located in the same sites as the migraine attacks, that is, temporal and/or frontal regions)[13,27] (Fig 1). Seven of them also had a diagnosis of tension type headache (TTH); however, the location of the TTH pain was different from that of the migraine attacks, that is, bilateral, mainly on head vertex and parieto-occipital areas, and had no relationship with the TrP stimulation; in fact, the TrP stimulation reproduced the migraine but not the TTH pain pattern. Patients with both migraine and TTH were able to clearly distinguish their migraine from their TTH pain.

Twenty-four patients meeting the inclusion criteria for control evaluation were selected (19 women and 5 men, ages 18 to 46 years, mean age: 33.3 $\pm$ 7) of 63 examined. They were affected with frontal or temporal migraine and showed TrPs in the sternocleidomastoid (n = 10), semispinalis cervicis (n = 8), or splenius cervicis (n = 6)

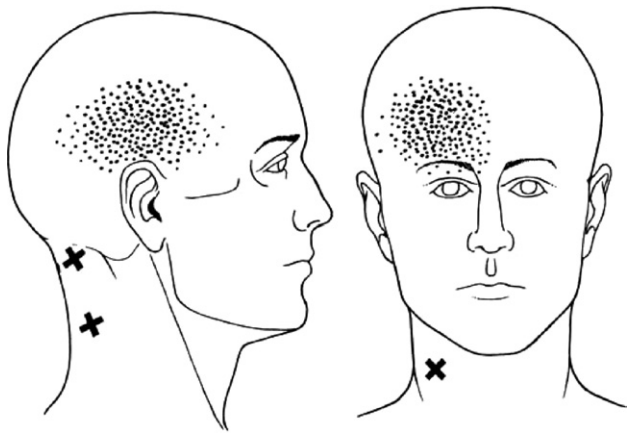

Figure 1. Referred pain areas in the examined patients. *Left figure*: Temporal area, referred from a trigger point either in the semispinalis cervicis (upper cross) or splenius cervicis (lower cross). *Right figure*: frontal area, referred from a trigger point in the sternocleidomastoid muscle. Modified from Simons et al.[27]