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**Changes in a patient with neck pain after application of ischemic compression as a trigger point therapy**

## Abstract.

*Objective*: To describe the immediate effects of ischemic compression (IC) as a trigger point therapy in a case of a patient with neck pain. The application of IC is a safe and effective method to successfully treat elicited myofascial trigger points. The purpose of this method is to deliberate the blockage of blood in a trigger point area in order to increase local blood flow. This washes away waste products, supplies necessary oxygen and helps the affected tissue to heal. In this case study, we treated a 27-year-old female patient with a medical report of neck pain for at least four months. The physical examination revealed a neck pain and stiffness at the left side and pain increases when moving the neck. An active myofascial trigger point was found in the left trapezius muscle. The following data were recorded: active range of motion of cervical rachis measured with a cervical range of motion instrument, basal electrical activity of the left trapezius measured with electromyography, and pressure tolerance of the myofascial trigger point measured with visual analogue scale, assessing local pain evoked by the application of 2.5 kg/cm$^2$ pressure with an analogue algometer.

*Results:* Immediately after application of the IC, all measured parameters improved compared to base line. The application of IC has been shown effective in the treatment of myofascial trigger points in a patient with neck pain. The results show a relation between active range of motion of cervical rachis, basal electrical activity of the trapezius muscle and myofascial trigger point sensitivity.

*Conclusions:* In this case of a patient with neck pain, active range of motion of cervical rachis, basal electrical activity of the trapezius muscle and myofascial trigger point sensitivity gaining short-term positive effects with the application of one single ischemic compression session. Nevertheless, randomized controlled double-blinded studies should be conducted in future to examine the effectiveness of this ischemic compression technique in case of the presence of myofascial trigger points in the neck.

**Keywords:** Myofascial Pain Syndrome, Myofascial Trigger Points, Algometry, Ischemic compression.

## 1. Introduction

Myofascial Pain Syndrome (MPS) is considered to be one of the most frequent causes of muscular pains [4,26]. MPS is characterised by the presence of Myofascial Trigger Points (MTrPs) on a sensitive spot in a taut band of skeletal muscle, which is painful on compression, generating motion and vegetative alterations. They are clinically classified as latent and active MTrPs, the difference being the presence of spontaneous referred pain in the case of the active MTrPs [25]. The etiology of the MTrPs is not currently known. The most accepted hypothesis focuses on the existence of dysfunctional endplates leading to a perpetuated shortening of the muscle [10,25]. This hypothesis is confirmed by the investigations of Shah [22,23].

Studies highlight the importance of the presence of latent muscular MTrPs, as this can cause a possible dysfunction in the muscle activation pattern and could be a determining factor in the appearance of future injuries [17]. Literature has shown that MTrPs could be the main cause of muscular neck pains [3,14]. Trapezius muscle is one of the most commonly studied [2,9,20].

Current literature indicates an important variety of therapeutic techniques used to return the fibre groups affected by MTrPs to their normal lengths, and the endplates to their normal function. These techniques can be placed in the following groups**:** invasive techniques e.g. injection therapy, MTrP dry needling, and non-invasive techniques e.g. massage, stretching, ultrasound (US) and ischemic compression (IC) [1,12, 13, 15, 19, 24].

As described by Travell & Simons [21], the first phase of each treatment consisted of applying IC to a number of tender points previously identified by palpation. To apply IC to a trigger point, the relaxed muscle is stretched to the verge of discomfort. Initially, a thumb (or strong finger) is pressed directly on the TP to create tolerably painful (7 to 8 on a client pain scale of 10), sustained pressure. Treatment is useless if the patient tenses the muscles and so protects the TP from pressure. As the discomfort tends to abate, pressure is gradually increased by adding a thumb or finger from the other hand, as necessary, for reinforcement. This process is normally continued up to 1 min. The purpose of IC is to deliberately increase the blockage of blood to an area so that, upon release, there will be a resurgence of blood and helps the affected tissue to heal. This method does not require specialized equipment; it is well tolerated by the patient, and is not physically strenuous on the clinician [13].

This case report documents the results achieved with IC as a therapeutic procedure for the treatment of neck pain. An innovation in our study is the use of surface electromyography (SEMG) to assess muscle changes after treatment. This method is referred in literature [5,18]. Moreover, establish a relationship between active range of motion (AROM) of cervical rachis, basal electrical activity (BEA) of the trapezius muscle and sensitivity of active MTrPs., due to the fact that they all responded positively with the application of one single stimulus.

## 2. Case report

A 27-year-old female came with a medical report of neck pain, with a greater discomfort on its left side. She is a left-handed person and pain evolution is around four months, through different acute episodes since. There is pain at the time and increases when moving the neck.

The patient has no previous diagnosis of fibromyalgia, radiculopathy or myelopathy. Neither has had cervical surgery or history of cervical whiplash. She has not received treatment for myofascial pain in the last month. No analgesics were taken during previous 24 hours.

The clinical examination findings are as listed below:

-Active MTrP in left trapezius muscle. In order to locate MTrPs, we followed the exploration diagnostic criteria established by Gerwin and Simons [11,24]:

1. Presence of palpable taut band in a skeletal muscle.
2. Presence of a hypersensitive tender spot in the taut band.
3. Local twitch response provoked by the snapping palpation of the taut band.
4. Reproduction of the typical referred pain pattern of the MTrPs in response to compression.
5. Spontaneous presence of the typical referred pain pattern and/or patient recognition of the referred pain as familiar (only for active MTrPs).

The possibility to manually locate MTrPs is described in the literature [21].

-A visual analogue scale (VAS) recorded the sensation perceived before measurements. The VAS was used to evaluate a possible change in pain intensity. The patient was instructed to indicate the intensity of pain by marking a 100-mm horizontal line with two extremes: no pain and worst imaginable pain. The result was 26-mm.

-Basal electrical activity (BEA) of the left trapezius muscle. BEA was measured using a MP 100 SEMG by BIOPAC Systems (Goleta CA, USA) and using adhesive electrodes, sized 2 cm in diameter, distributed by Lessa (Barcelona, Spain). The patient was lying in the supine decubitus position on a hydraulic therapeutic table, with its head in a neutral position and extremities relaxed. The electrodes were placed 20mm lateral to the midpoint along a straight line from the spinous process of the seventh cervical vertebra (C7) to the lateral edge of the acromion [16]. Electrodes were left attached throughout the treatment to facilitate post-treatment data collection. The signal was recorded for 10 seconds. The result was 0.00108 millivolts (mV).

-Pressure Tolerance (PT). PT was assessed using a pressure analog algometer (PAA) Manufactured by Wagner Instruments (Greenwich CT, USA) and distributed by Psymec (Madrid, Spain). A pressure of 2.5 $kg/cm^2$ was applied on MTrPs of the trapezius muscle [1,6]. The VAS recorded the sensation the patient perceived in that moment. The result was 93 mm. for MTrP of left trapezius muscle.

-Restricter neck mobility was caused by pain. Active range of motion (AROM) was measured with a cervical range of motion instrument (CROM) distributed by Performance Attainment Associates (Lindstrom MN, USA). This apparatus combines inclinometers and magnets to provide accurate measurement of AROM of cervical rachis and it was adjusted to the occipital area using a Velcro© in order to avoid oscillations during cervical movements. The patient was instructed to sit upright, relax their shoulders and rest their hands on their thighs, with hips and knees flexed at 90º [1]. The cervical mobility in right lateral flexion was $42^o$.

The treatment of choice for the myofascial pain of trapezius muscle was IC of MTrP. The IC was performed according to the methodology described by Fryer and Hodson, however we extended the treatment from 60 to 90 seconds [7].

The immediate effects observed were:

-An improvement in sensation perceived. The result for the VAS was 12-mm.

-A decrease in BEA. The result was 0.00092 mV.

-An increase in PT. The result for the VAS was 50-mm.

-An improvement in the AROM. The result was $48^{o}$.

There were no adverse effects resulting from treatment. The same examiner recorded the data before and after, and a different examiner applied the treatment. Both operators have more than 10 years' clinical experience working with MPS and the application of manual therapies.

## 3. Discussion

We have obtained satisfactory short-term results after treatment of active MTrP with IC. We can establish the relation between AROM, BEA of the trapezius muscle and MTrP sensitivity of this muscle, gaining short-term positive effects with use of the same stimulus.

The effect of IC on MTrP, either combined with other therapies or not, had been studied by several authors [6,7,8]. These studies measured changes in sensitivity, concluding that IC causes a decrease, but only one of them measured the range of motion [8]. This study concludes that IC increases AROM, establishing a relationship with a decreased sensitivity of MTrP.

Our previous study, exploring the effectivity of IC and US [1]**,** suggests a relationship between active range of motion of cervical rachis, basal electrical activity of the trapezius muscle and myofascial trigger point sensitivity of the trapezius muscle. Short-term positive effects by using IC on latent MtrPs were found in this study of a group of healthy subjects.

The case report in this study shows the possibility of establishing a relationship between these variables (AROM, sensitivity and BEA). Future studies should confirm this relationship in symptomatic subjects presenting active MtrPs and confirm this connection with a significant number of subjects with neck pain and long-term monitoring. We believe this finding has clinical importance. From a practical standpoint, the physiotherapy has several techniques for the treatment of myofascial pain, but do not always know why they are effective. If we can develop techniques to apply in a fast manner and as well obtain an immediate response to prove its effectiveness, clinicians will be better able to optimize their resources.

Now we know that the effect of IC probably has been demonstrated in the muscle (decreased BEA), together with decreased sensitivity of MTrP, it can explain the increased AROM of the cervical rachis in this patient with neck pain.

In conclusion, ischemic compression (IC) has been shown to be effective in the treatment of active MTrP in a patient with neck pain. This case study shows a relation between AROM of cervical rachis, BEA of the trapezius muscle and MTrP sensitivity gaining short-term positive effects with use of IC. Although there exists at first sight some evidence to support this clinical approach, randomized controlled double-blinded studies should be conducted in order to explore the effectiveness of this IC method.

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