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BIOMECHANICAL AND THERAPEUTIC IMPLICATIONS OF THE ANATOMICAL LOCATION OF TRIGGER POINTS

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ABSTRACT. This article establishes the existing correlations between the anatomical location of muscle trigger points and their ability to affect joint mobility. Deeply located muscles, such as the brachialis and piriformis, do not have joint biomechanical consequences when they contain trigger points, but are more difficult to approach therapeutically, in the sense that they require the injection of anesthetics or anti-inflammatories, the maneuver being guided by ultrasound. Theoretically, patients with arthritis are more exposed to being affected by such trigger points. Cervical or temporo-mandibular biomechanical disorders are caused by trigger points in the trapezium, respectively sternocleidomestoid.

Key words*: myofascial pain, joint hypomotility, brachial, piriformis, arthritis*

REZUMAT. Acest articol stabileşte corelaţiile existente între localizarea anatomică a punctelor trigger musculare şi capacitatea acestora de a afecta mobilitatea articulară. Mușchii situaţi profund, ca de exemplu brahialul şi piriformul, nu au consecinţe biomecanice articulare atunci când conţin puncte trigger, dar sunt mai dificil de abordat terapeutic, în sensul că necesită injectarea de anestezice sau antiinflamatorii, manevra fiind ghidată ultrasonic. Teoretic, pacienţii cu artrită sunt mai expuşi de a fi afectaţi de astfel de puncte trigger. Afecţiuni biomecanice cervicale sau temporo-mandibulare sunt provocate de punctele trigger din trapez, respectiv sternocleidomestoidieni.

Cuvinte cheie*: durere miofascială, hipomotilitate articulară, brahial, piriform, artrită*

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Introduction

The correlation between trigger points and joint hypomobility is frequently reported by physicians, however, the order in which these muscle and joint deficiencies should be addressed therapeutically not known and thus further studies are needed (Fernández-de-Las-Peñas, 2009). On the other hand, considering stiffness as a biomechanical property of trigger points of the soleus muscle, only dry acupuncture (dry needling) managed to improve it (Jiménez-Sánchez et al, 2021). It turns out that trigger points biomechanically affect both joints and muscles. As a result, the current work aims to analyze the biomechanical and therapeutic implications of the anatomical location of these trigger points, that is, depending on the affected muscle.

Neck, upper back and shoulders

For trigger points located in the upper trapezius, dry acupuncture (dry needling) has better results for improving pain, neck and shoulder disabilities than compression (Ziaeifar et al., 2019). When the trigger points are located both in the upper trapezius and in the infraspinatus muscle, in athletes with unilateral shoulder impingement syndrome, dry acupuncture for the treatment of shoulder and arm pain and disability has better results when it targets only the infraspinatus in terms of patient comfort (Kamali, Sinaei & Morovati, 2019). When the trigger points are located in the upper trapezius, sternocleidomastoid or levator scapula, there is neck pain and hypomotility at the C3-C4 level, and the analgesic therapies used are ischemic compression and spinal manipulation (Fernández-de-Las-Peñas, 2009). Latent myofascial trigger points located in the sternocleidomastoid muscle can cause a reduction in the amplitude of the temporomandibular joint, one of the therapeutic means being kinesio taping (Bae, 2014). In patients with cervicogenic headache, manual therapy targeted to the active trigger points of the sternocleidomastoid results in the reduction of the headache, the improvement of the motility of the deep cervical flexors and the range of motion of the cervical spine (Bodes-Pardo et al., 2013). For migraines with the same etiology, dry needles applied to the active myofascial trigger points of the sternocleidomastoid can also be used (Rezaeian et al., 2020). Relief of headache with this etiology can also be obtained with ischemic compression, but it seems that the biomechanical properties of the myofascial trigger points are not influenced (Jafari, Bahrpeyma & Togha, 2017). For chronic mechanical neck pain, a condition in which the trigger points of the trapezius and levator scapula are involved, pain and cervical range of motion

are improved more effectively by dry needling combined with manual therapy than by sham dry needling combined with manual therapy (Gallego-Sendarrubias et al., 2020). In the case of the presence of trigger points in the upper trapezius, the activation of the deltoid and serratus anterior during the raising of the arm is delayed (Bohlooli et al., 2016).

Arms

Trigger points located in the brachial biceps can be the basis of shoulder pain (Bron et al., 2007). For the pathological problems of the rotator cuff which are caused by the presence of trigger points located in the brachial muscle, trigger points injection with anti-inflammatory drugs, guided by ultrasound, is used (Suh et al., 2014).

The pelvis and the lower limb

Trigger points in quadratus lumborum, gluteus medius, gluteus minimus and piriformis can result in low back pain and leg pain referral (Holm et al., 2020). It should be mentioned that the latent trigger points in the gluteus medius can limit the movements of the coxofemoral joint (Bagcier et al., 2022). The application of trigger point dry needling is able to improve the biomechanical properties of the gluteus medius (Schneider et al., 2022). Piriformis syndrome can be the cause of low back pain, and the treatment of the trigger points of the piriformis muscle is done by ultrasound-guided injection of anesthetics (Aquino-Jose et al., 2020). The trigger points in the quadratus lumborum can be the cause of low back pain, possibly associated with buttock pain, and their treatment can be done by applying needles to the deep trigger points followed by lidocaine injection (Sirh et al., 2022).

Discussions

Important biomechanical implications are those of the trigger points located in the sternocleidomastoid muscle (for the temporomandibular joint) and of the trigger points located in the upper trapezius (for the shoulder joint). Dry needling is the treatment of choice. Sternocleidomastoid affected by trigger points can be the cause of migraine, and trapezius with myofascial pain can affect the biomechanics of the arm, so other elements of differential diagnosis

are present here. The shoulder can also be affected by the trigger points located in the brachial or biceps brachii. In case of localization of trigger points in the brachial, ultrasound-guided anti-inflammatory injection is used, probably due to the deep anatomical situation. Shoulder pain can also be caused by trigger points located in the trapezius (not only in the biceps brachii or brachii muscle), but in this case disability of the neck, arm, hand, and shoulder is also present (Ziaeifar et al., 2019). It is interesting that the trigger points located in the gluteus medius, which can be treated by dry needling, can cause biomechanical problems of the coxofemoral joint, while the trigger points located in deeper muscles (piriformis or quadratus lumborum), whose therapy is done by ultrasonic guided injection, no. Quadratus lumborum does not have a trochanteric insertion and thus it could be explained that its myofascial damage has no implications on the coxofemoral biomechanics, but the gluteus medius and the piriformis muscle insert on the greater trochanter. The explanation would lie in the muscle volume, smaller for the piriformis. The same considerations apply to the brachialis, a deep muscle that is more difficult to treat therapeutically (the treatment of trigger points requires ultrasound-guided injections). Its myofascial damage does not cause disabilities of the arm like that of the trapezius (whose trigger points can be treated by dry needling). An interesting fact is that arthritis can cause the appearance of muscle trigger points, among the incriminated factors being the reduced mobility due to that disease (Reynolds, 1981). Considering that deep muscles such as the piriformis or the brachialis have a relatively low mobility, we can consider that they are prone to the appearance of trigger points in patients with arthritis. A vicious circle is thus created, myofascial pain biomechanically affecting the muscle and increasing stiffness.

Conclusions

1. The trapezius and sternocleidomastoid muscles can cause, when they contain trigger points, biomechanical dysfunctions, the treatment being represented by dry needling, compressions and kinesio-taping.
2. Deep muscles such as the piriformis or the brachialis, when they contain trigger points, do not affect joint biomechanics, but require treatment by injection.
3. Theoretically, deep muscles are more susceptible to develop trigger points in patients with arthritis.

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