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Dry Needling Treatments for Myofascial Trigger Points

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ABSTRACT. Objectives: To briefly describe myofascial trigger points and the different dry needling procedures that can be used in their treatment, and to discuss the effectiveness of dry needling techniques and their indications.

Findings: There exist different dry needling techniques that can be used in the treatment of trigger points. These techniques seem to be effective in treating this condition. There seems to be an increasing number of indications of these techniques within the context of myofascial pain syndrome.

Conclusions: Dry needling techniques are rapidly expanding among healthcare providers. More research is needed to know the mechanisms of dry needling in order to improve its efficiency and the patients' tolerance of the techniques.

KEYWORDS. Dry needling, myofascial trigger point, myofascial pain syndromes, physical therapy modalities

INTRODUCTION

Myofascial pain syndrome [MPS] can be defined as the set of sensory, motor, and autonomic signs and symptoms caused by myofascial trigger points [TrPs] (1, 2). These signs and symptoms include pain [often experienced as a telalgia, outside the responsible TrP], muscle weakness, restricted range of motion, uncoordination, increased fatigability, delayed recovery and delayed relaxation after exercising, muscle spasm observed by electromyography [EMG] at the pain referral zone (1), and alterations in motor activation patterns (3). All this means that the clinical manifestation of the MPS and the way patient is affected by it will vary depending on the muscle or group of muscles involved.

According to the integrated hypothesis (4–6), the most widely accepted etiological theory, TrPs are small muscular contractures caused by dysfunctional motor endplates (7–14). These muscle contractures give rise to taut bands of muscle fibers that are identifiable by means of palpation (15–17), ultrasound imaging (18, 19), and magnetic resonance elastography imaging (20). The TrP can be subjectively identified by palpation (15–17, 21), and objectively identified by specific microanalytical techniques (22), by the combination of three different ultrasound

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imaging techniques (19) and by needle EMG (7–14). Both specific microanalytical techniques and ultrasound imaging [by measuring the blood flow waveform with Doppler imaging] techniques can reliably distinguish between active [symptom-producing] and latent [not spontaneously pain-generating] TrPs. When properly used, needle EMG can show an anomalous spontaneous electrical activity, recognized as endplate noise (7–11, 13, 23). Some authors consider this anomalous EMG activity as the gold standard for the objective diagnosis of TrPs (13, 24) and its prevalence, a clear indication of their degree of clinical activity (25).

The treatment of MPS can be divided in two phases (26, 27). The first phase is of pain control in which the TrPs are identified and treated in order to eliminate pain, and in the second phase etiological and perpetuating factors are identified and addressed in order to prevent recurrences. As, most of the times, perpetuating factors also increase the clinical activity of TrPs and make them more refractory to treatment (1), in the clinical setting both phases must commonly overlap. Techniques used to treat TrPs are mostly employed in the first phase of pain control.

Dry Needling Treatments

Different ways for treating TrPs can be classified into two categories:

- Conservative therapy: In this case therapeutic agents do not pass through the skin.
- Invasive therapy: In this case therapeutic agents are applied percutaneously.

Invasive therapy includes different techniques ranging from needling with different tools, mostly needles, to surgery (28, 29). The most widely used invasive therapy in the treatment of MPS is the needling technique. In this context, needling techniques can be divided into dry needling [DN] techniques and injection techniques. In this article, we have specifically dealt with DN techniques.

Dry needling techniques are considered physical therapy techniques because they use the mechanical stimulation of the needles as the physical agent to treat a condition, a muscle contracture, that falls within the scope of physical therapy (30–33). Nevertheless, any officially recognized healthcare professional with the adequate training in the diagnosis and in the needling treatment of this condition could use it (34).

There are different DN techniques for the treatment of TrPs, which can be classified attending to different criteria: the tool used, the kind of stimulation employed, the depth to which the DN tool is inserted, the concept in which the DN technique developed (32, 33), or the healthcare practitioner using it.

The most widely used classification criterion is the depth. According to this criterion, DN technique should be classified as follows:

- Superficial DN [SDN]: In this technique the tool does not reach the TrP and stays in overlying tissues.
- Deep DN [DDN]: In this technique the tool reaches the TrP and passes through it.

Previous classifications done according to depth defined SDN as the technique in which the tool did not reach the muscle, and DDN as the technique when the needle reached the TrP (30). These definitions left an ambiguous gap in the cases in which the needle entered the muscle without reaching the TrP. For instance, in our experience, using a 50-mm long needle for DN of gluteal muscles could result in DDN for gluteus mediums' TrPs but result in SDN for deeper gluteus minimus' TrPs because the needle will not be long enough to reach them in most adults.

Examples of SDN are Peter Baldry's technique, Fu's subcutaneous needling technique, and neuroreflexotherapy.

In Baldry's technique (35, 36), a small acupuncture needle is employed and is inserted to a depth of 5–10 mm. Depending on the patient's responsiveness to treatment, the needle is left in place during different times, from just for a few seconds to several minutes, and applying a variable neurological stimulation of the needle through mechanical [manually applied] or electrical stimuli.

In Fu's subcutaneous needling technique (37, 38), a needle with a catheter, as those employed for intravenous injections, is inserted below the skin, almost parallel to it. The needle is then manipulated through the handle from side to side 200 times for over 2 min. The needle is withdrawn and the catheter is left in place for 2 hr in acute cases to 24 hr in chronic cases.

In neuroreflexotherapy (39, 40), surgical staples are inserted in subcutaneous tissues overlying TrPs for a prolonged length of time [several weeks or even several months]. Published papers regarding this technique did not make clear whether the staples were inserted in previously diagnosed TrPs or in any other kind of TrPs, as diagnostic criteria for the selected TrPs were not stated clearly.

Examples of DDN techniques are Hong's fast-in and fast-out technique, Chow's screw-in and screw-out technique, Gunn's intramuscular stimulation technique, and miniscalpel-needle release technique.

Hong's fast-in and fast-out technique was initially described as an injection technique (1, 41), but many therapists used it as a DDN technique. In this modality, the needle is repeatedly inserted into the TrP trying to get as many local twitch responses as possible within a patient's tolerance. Chow's screw-in and screw-out technique (42) is a modification of Hong's technique especially adapted for its use with small acupuncture needles. In this technique, the needle is inserted and withdrawn by means of a rotational movement of the needle.

Gun's intramuscular stimulation therapy (43–45) employs a plunger to insert and manipulate an acupuncture needle inside the muscle, within the frame of a radiculopathic pain concept (32, 33, 43, 44) and uses a therapeutic protocol specially designed to treat chronic pain patients.

Miniscalpel-needle release technique (46, 47) uses two or three insertions of a specially designed needle with a cutting edge in the tip and with a much thicker shaft [1 mm] than the conventional acupuncture needles commonly employed in DDN.

Dry needling sometimes combines with other therapeutic agents, such us different substances (1, 41, 48) or electricity (30, 31, 33, 49) in the treatment of TrPs, or with autologous blood in other contexts (50–52). The combination of DN with electrical stimulation received many different names (30, 33) but, probably, the better-suited term for this combination within the frame of MPS treatment is "percutaneous electrical stimulation of TRPs" (31).

Effectiveness of Trigger Point Dry Needling

Besides the initial remark made by Steinbrocker (53) about the effectiveness of the mere insertion of the needle to treat musculoskeletal pain, several studies by different authors have shown that DDN is as effective as the injection of diverse substances (48, 54–57) in the treatment of TrPs.

The available reviews about the effectiveness of DN always reached similar conclusions. Cummings and White (58) in their 2001 systematic review concluded, "Direct needling of TrPs appears to be an effective treatment, but the hypothesis that needling therapies have efficacy beyond placebo is neither supported nor refuted by the evidence from clinical trials. (. . .) Controlled trials are needed to investigate whether needling has an effect beyond placebo on TrP pain." Similar conclusions were drawn from two more recent systematic reviews about dry needling (59, 60). Owing to the invasive nature of DN, it is rather difficult to design double-blind placebo-controlled studies (33). Different placebo needles or sham needling procedures are questioned for considering that all of them involve some kind of physiological stimulation, which disqualify them as a true placebo intervention (61). To avoid this bias we recently conducted a randomized, double-blind, placebo-controlled clinical trial about the effectiveness of TrP-DN in the prevention of myofascial pain after the total knee replacement [Mayoral et al., unpublished data]. In our study 40 subjects were examined for TrPs by an experienced examiner several hours before the knee replacement surgery. Subjects were then assigned either to a true DN group or to a sham DN group. Right after anesthesia and right before surgery started, subjects in the true DN group were dry needled of all previously diagnosed TrPs, while subjects in the sham DN group received no treatment for their TrPs, although the physical therapist applying DN was in the surgery room with the subjects during anesthesia procedure and simulated the needling right afterwards. Since subjects were not able to feel anything, they were completely blinded to group allocation as well as to the TrP examiner in all pre-surgical and follow-up examinations. Subjects in the true DN group had less pain after surgery, with statistically significant differences in post-surgery analgesics demand [$p = .02$] and in the rate of change of different visual analog scale [VAS] measurements 1 month after surgery [VAS > 4, $p = .03$; VAS $= 0$, $p = .04$]. The results of this study show a superiority of DN versus placebo and present an interesting novel placebo methodology for DN.

Indications of Dry Needling Treatments

Besides the obvious indication of TrPs, nowadays some other possible indications of DN are emerging within the context of MPS.

Most of the time, when we talk about TrPs, we are implicitly referring to central TrPs [cTrPs]. It is not clear whether DN could be used in attachment TrPs [aTrPs]. Since Simons has introduced the concept of aTrP (1, 62), no published study has included the distinction between cTrPs and aTrPs. According to Simons, an aTrP is an enthesopathy caused by a cTrP. The tension generated in the muscle fibers by the contractured sarcomeres of the cTRP would propagate to the myotendinous or bone attachments of the taut band, giving rise to enthesopathic changes. According to this definition, the obvious treatment for an aTrP is the elimination of its cause, the cTrP. Nevertheless, from a clinical perspective, when enthesopathy develops, it usually needs to be addressed and the sole treatment of the cTrP would not suffice. Some authors consider that there is a close relationship between cTrPs and aTrPs and the treatment of either of them would be beneficial for the other (1). Clinical experience and some papers (50–52) suggest that DN could also be successfully used in aTrPs. Studies are needed to unequivocally establish this indication of DN.

Some reports seem to show some effectiveness of DN of TrPs in the control of spasticity in neurological patients (63, 64). Clinical trials should investigate this possibility.

The use of DN for non-myofascial trigger points, such as ligamentous TrPs, has never been established, although clinical experience and some reports [Fischer A, personal communication] (65, 66) suggest this possibility that should be seriously explored.

CONCLUSIONS

Dry needling includes a set of techniques that are widely used by different healthcare professionals. There is increasing clinical and scientific evidence that DN is an effective and efficient procedure for the treatment of TrPs. Research is needed to better know its mechanisms so that indications can be properly defined and treatment protocols can be reliably established to achieve better results and to improve the patients' tolerance to these techniques.

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