

Dry Needling: An Invasive Physical Therapy Technique

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Abstract

Myofascial trigger points (MTrPs) of the upper trapezius muscle causes impairment of functional activity and reduces the quality of life. Several physical therapy interventions can be used to treat myofascial trigger points. Currently, dry needling (DN) is emerging as a physical therapy technique for use in treating MTrPs. The aim of this narrative review was to evaluate the effectiveness of dry needling in treating myofascial trigger points of the upper trapezius muscle. The PubMed database was searched for articles published through December, 2018. The main problem of most articles exists in the methods section; therefore, their results may be affected by bias. A standardized guideline for both the training and practice of using DN to treat MTrPs should be developed to minimize the risk of DN complications.

Keywords: Dry needling, Physical therapy, Myofascial Trigger Points

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Introduction

One of the most important chronic problems encountered by physical therapists in clinical practice is myofascial pain syndrome, a common non-articular musculoskeletal disorder described as pain in a localized hypersensitive spot (trigger point) in a palpable taut band of muscle and classified as either latent or active (1, 2).

Postural muscles, specifically the upper trapezius, is highly likely to develop MTrP due to overuse (3). Pain and tightness, tension headaches, neck pain, vertigo, and limited range of motion in the neck and shoulder are associated with MTrPs in the upper trapezius muscle.

Physical therapy techniques for managing MTrPs can be divided into non-invasive (manual therapy, exercise therapy, electrotherapy) and invasive (acupuncture and DN) types. Dry needling has been defined as an unproven technique in which a fine needle is inserted into the muscular fibers to treat MTrP (2).

There are two types of DN, i.e. superficial and deep, which target primarily peripheral sensory afferents and dysfunctional motor units, respectively; however, using both types of DN on suboccipital

and upper trapezius muscles may be effective in reducing trigger-point tenderness and increasing active range of motion (4).

Complications associated with needling include pain, bleeding, bruising and infection at the needle insertion site, pneumothorax, nerve injury, and cardiac tamponade (5). A review of the literature showed that the number of studies on DN complications is very limited. In addition, acceptable guidelines clearly indicating the effectiveness and side effects of DN in comparison with other physical therapy techniques remain to be investigated. Therefore, the purpose of the current article was to evaluate the dry needling technique as an invasive physical therapy procedure for treating myofascial trigger points of the upper trapezius muscle. The PubMed database was searched for relevant articles published through December, 2018.

Review Articles

The taut bands of muscular fibers can be caused by excessive acetylcholine released at the neuromuscular junction which increases metabolism, causes local ischemia, and leads to the

increased secretion of sensitizing substances. Pain can cause autonomic reactions such as increased sweating, vasoconstriction or vasodilation, and pilomotor activity in the muscle. (6, 7) Abbaszadeh-Amirdehi *et al.* (8) reported that they did not find any study on the neurophysiological effects of DN in patients with MTrPs. Their study (8) showed that DN on the active MTrPs of the upper trapezius muscle reduced sympathetic hyperactivity and motor end-plate irritability measured by the sympathetic skin response and neuromuscular junction response, respectively (using electromyography), and lessened pain in the upper trapezius muscle. However, the lack of a control group was an important limitation of their study. No follow up or evaluation of the long-term effects of DN also weakened their results.

Gatte *et al.* (2) stated that, despite the weakness of most of the evidence for the use of DN, this technique may be the most effective for pain relief in the immediate to 12-week treatment period, and if utilized in appropriate patients, it can significantly decrease musculoskeletal pain. However, they also mentioned that further high-quality studies with long-term outcomes were still needed as well as comparisons of the effectiveness of DN with that of other physical therapy interventions and modalities which could influence musculoskeletal pain. The key point in this meta-analysis was the need for higher quality studies in the future.

In another meta-analysis study (9), 19 articles (from 2000 to 2013) were reviewed, and the researchers pointed out that DN could be effective as a physical therapy modality for pain relief when compared to no treatment, although it was not significantly different from the placebo. In addition, they concluded that several interventional treatments achieved stronger pain relief than DN after 3-4 weeks.

Another systematic review (10) evaluated articles published between 2000 and 2015. The researchers concluded that further evidence obtained through high quality and standardized procedures are needed, though some studies have shown dry needling to have positive effects.

Conversely, Segura-Orti *et al.* (11) referred to three studies and reported that no subjects receiving DN procedures abandoned treatment because of exacerbated symptoms (12-14).

Electrical DN can also be used and has been commonly applied to other areas of the body. Recently, Dunning *et al.* (15) compared the effects of adding electrical dry needling into a program of manual therapy, exercise, and ultrasound in plantar fasciitis patients. The results of their randomized clinical trial showed that individuals with plantar fasciitis who received manual therapy, exercise, and ultrasound plus

electrical dry needling experienced significantly greater improvement than those receiving manual therapy, exercise, and ultrasound alone. However, their study lacked a long-term follow up and had no placebo group.

Shanmugan *et al.* (16) mentioned that theoretically, multilevel electrical stimulation effects can induce widespread pain inhibition, segmental relaxation, tissue healing, etc. They treated nine patients with MTrPs of the shoulder with intramuscular electrical stimulation. Based on their results from this small sample size, they concluded that electrode placement can be an appropriate method of chronic pain management.

Gerber *et al.* (17) stated that dry needling reduces pain due to changes in trigger point status, which is associated with a statistically and clinically significant reduction in pain, and that pain relief is associated with improved mood, function, and level of disability. They used a verbal analog scale and the brief pain inventory in addition to palpating MTrPs as outcome measures. However, they did not mention anything about pathophysiological evidence and the reliability of their outcome measures. Pain is a multifactorial variable, and subjective measurable devices can be influenced by several psychosocial parameters.

Deep DN has also been used on stroke individuals to decrease pressure pain sensitivity and muscular spasticity (18). One study (19) reported that a single session of DN reduced spasticity in wrist flexors and improved alpha-motor neuron excitability; these improvements continued for just one hour after dry needling in stroke patients.

A recent systematic review and meta-analysis (20) associated with evidence of the effectiveness of DN on MTrPs in patients with low back pain stated that studies of moderate quality have shown that DN relieved the intensity of low back pain post-intervention. These authors (20) concluded that more multiple-center randomized controlled trials with a higher level of quality, larger samples, and adequate follow-up times are necessary.

Some authors (21-23) have reported post-needling soreness as a side effect of DN which varies in duration from a few hours to 2-3 days. Leon-Hernandez *et al.* (21) recommended the use of percutaneous electrical nerve stimulation after DN. Martin-Pintado-Zugasti *et al.* (22) stated that all subjects treated with DN for latent MTrPs of the upper trapezius muscles suffer from post-needling soreness. Also, women appear to experience a higher intensity of soreness than men, and the number of needle insertions is related to the intensity of the soreness. The authors did not adequately prove the correlation

between soreness and the presence of bleeding at the needle site; thus, they recommended further research be done.

Martin-Pintado-Zugasti *et al.* (23) recommended the use of psychological procedures for reducing post-needling soreness and mentioned that ischemic compression could be a useful manual therapy technique for reducing such soreness. In 2018, Kim *et al.* (24) reported the case of a 16-year-old boy who suffered from an abscess at the site of dry needling and was treated for pain.

Conclusion

There are numerous studies on skeletal muscles and their relation to MTrPs and its pathogenesis which may be trauma, muscle overload, muscle over-use, etc. In general, there is not enough valid evidence for the effectiveness of DN or its side effects. The low quality of DN research may be explained by the small sample size and weak reliability, validity, and meaningfulness of the outcome measures. Moreover, physical therapy techniques should not have aggressive and invasive structures.

The DN technique as a type of physical therapy has not yet been included on the syllabi of some universities; instead, it is taught as a private short course. Medical organizations and physical therapy associations of some countries may not be able to adequately protect physical therapists against patient complaints due to DN side effects. Currently, a variety of practitioners are using DN to treat MTrPs. It is suggested that guidelines for the training and practice of DN should be developed and approved in order to minimize the risk of complications.

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