Review Article

Encroachment By Dry Needle for the treatment of Orofacial Pain

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Abstract: Historically, the pain of dental ills has been a constant tormentor since human beings arrived on earth. Various clinical effects have been credited to exponentially growing interest in dry needling therapy. The studies of potential effects of DN are reviewed in reference to the different aspects involved in the pathophysiology of myofacial trigger points: the taut band, local ischaemia and hypoxia, peripheral and central sensitization. This article aims at what effects could be attributed to dry needling and what are their potential underlying mechanisms of action, and also indicate some directions at which future research could be aimed to fill currents voids.

Keywords: Dry needling; Trigger points; Myofascial; Orofacial; Temporomandibular joint disorders.

INTRODUCTION

Orofacial pain is a general term covering any pain which is felt in the mouth, jaws and the face. It is estimated that 95% of cases of orofacial pain result from dental causes. After dental pain, second most common cause of orofacial pain is temporomandibular joint dysfunction. It has been defined as "pain localized to the region above the neck, in front of the ears and below the orbitomeatal line, as well as pain within the oral cavity, including pain of dental origin and temporomandibular disorders. However some orofacial pain conditions may involve areas outside the region.e.g. temporal pain in TMD. Craniofacial pain is an overlapping topic which includes pain perceived in the head, face and related structures, sometimes including neck pain.[3]

Muscle pain is a commonly overlooked factor in the etiology and perpetuation of craniofacial pain (CFP). The physiological mechanisms of muscle pain have been well described, for e.g. hyperactivity and pain within the masticatory muscles due to diurnal or nocturnal parafunction with or without the presence of an intrinsic TMJ dysfunction is commonly observed in the temporalis, masseter and medial pterygoid. Hyperactivity of the superior belly of the lateral pterygoid may contribute to the anterior disc displacement within the TMJ. The etiology of CFP is not solely limited to local or intrinsic pathological, musculoskeletal or mechanical factors. One of the most overlooked etiological factors in CFP is referral from upper quarter structures including the cervical spine and shoulder girdle.

Dry needling is a therapeutic technique, origin of the term "dry needling" is attributed to Janet G. Travell, M.D. in her book, 'Myofacial pain and Dysfunction: Trigger Point Manual' which uses either solid thin filliform needles or hollow core hypodermic needles, inserted into muscle, ligament, tendon, subcutaneous fascia, scar tissue, peripheral nerve or neurovascular bundles, for the general purpose of reducing pain associated with neuro-musculo-skeletal conditions.[4,5,6,7,8] The technique is also referred to as "intramuscular manual therapy", when needles are inserted into muscle tissue.[4,8]

The solid thin filliform needle used in dry needling is regulated by the FDA as a class ll medical device described in the code titled "sec. 880.5580 acupuncture needle".[5] Dry needling is used in the treatment of myofascial pain syndrome (MPS). MPS is characterized by the presence of myofascial trigger points (MTrPs).[9]MTrPs develop in response to injury or trauma , muscle overuse or overload, repetitive microtrauma or poor posture;[10,11,12] it may cause local and/or referred pain and/or aggravation of existing pain.[0,13,14,15] In addition MTrPs may contribute to motor symptoms, autonomic phenomena, impaired range of motion, and increased sensitivity to stretch.[10,11,13-20] Active MTrPs may cause spontaneous pain, while latent MTrPS only elicit symptoms when compressed or palpated, it may be found locally (near the primary site of pain) or at sites distal to the pain.[9,19-

[21]Clinically, MTrPs are defined as tender taut bands (or contraction knots) within a muscle that contain hyperalgesic zones.[10,11,14,21,22] The development of MTrPs consists of four overlapping stages.[11,23] In the first stage, a taut band develops due to excessive acetylcholine release at the motor endplate with resultant abnormalities in endplate action potential. The taut band is due to sarcomere shortening and a heightened state of contraction.[24]In the next stage, localischaemia and hypoxia develops due to sustained sarcomere contractions. Alteration in the local chemical environment, such as increases intramuscular acidity and elevated levels of several nociceptive substances, are involved in stimulation of muscle nociceptors.[25,27] In the third stage, sensitization of peripheral nociceptors occurs, due to the release of vasoactive and algogenic substances, resulting in heightened peripheral sensitivity.[11,23] Finally, central sensitization of the dorsal horn neurons and supraspunal structures can develop, resulting in hyperalgesia and allodynia.[11,23]

Dry needling is proposed to have physiological effects at all stages of MTrP development. In the first stage, dry needling acts to interrupt spontaneous electrical activity by eleiciting a localized twitch response and reducing the contraction in the trigger point.[28]Dryneedlingalso stimulates mechanoreceptors[29]and diminishes availability of acetylcholine in the endplate region.[30,31] In the ischaemia and hypoxia stage of MTrP development, dry needling causes vasodilation and may increase hypoxive-responsive proteins that support angiogenesis, vasodilation and altered glucose metabolism.[31-34] In addition, dry needling reduces peripheral sensitization by decreasing levels of substance P and the calcitonin gene-related peptide.[31] Finally dry needling can mitigate central sensitization by segmental inhibition or gate control,[28,35] release of endogenous opiods[36] and activation of serotonergic and noradrenergic descending inhibitory tracts.[37]

Dry Needling Technique:

It involves the insertion of a fine, solid filiform needle. The needle penetrates the skin but does not introduce any analgesic medications.[38]When dry needle is performed on muscles, the length of the needle selected is contingent upon muscle size with thicker muscles requiring longer and thicker needles.[39] Prior to inserting the needle into muscle, the clinician palpates the MTrP and cleans the overlying skin with isopropyl alcohol.[38]

Several dry needling techniques in the context of MTrPs are noted in the literature. In one, clinician pinches the MTrP between two fingers and inserts the needle between the two fingers about 1-2 cm from the MTrP at a 30° angle to the skin.[38] The needle is moved slowly up and down within the superficial and deep muscle fibres like a pisto, with or without withdrawl from the tissue, in order to elicit a local twitch response.[19,40] Needle twirling is at times also performed adjunctively, which causes a fascial stretch.[8] The local twitch response is a contraction of the muscle fibers in the immediate vicinity of the DN, as the result of an involuntary spinal reflex.[18] Another form of DN technique involves needle insertion perpendicular to the skin, followed by movement of the needle until it meets a trigger point[41]. Needles can also b inserted so that they are left to stand independently in the tissue for 30 seconds to five minutes with intermittent needle rotationuntil the abolition of a “jump sign”.[29,39,42] Inserting the needle deeper affects skin, fascia and muscle and has a better analgesic effect than when inserted only into the skin and superficial muscle.[43]

Optimal dosage of dry needling remains unclear and the dosage used in RCTs to date is variable.[4]Dommerholt recommends waiting 7-10 days before needling the same muscle again.[8] A localized twitch response often described as the desired response, although many RCTs describe a “deqi” response, defined as subjective reports of dull ache, heaviness, or other transient sensory perceptions at the site of needle insertion.[4] It is also common for the patient to report referred pain in similar distributions to that

describedby Simons and Travel.[10,11] Dry needling may also be administered to sites distal to local MTrPs.[4] Typically dry needling of MTrPs is followed by stretching exercises and other interventions directed toward the patient's impairments. The well-informed clinician utilizes dry needling as part of a comprehensive treatment program that addresses the underlying structural, movement and posture related problems that caused or propagated the MTrPS.

DISCUSSION

DN has become a popular treatment technique with an increasing amount of studies demonstrating its clinical effects. It seems logical that mechanisms and effects of DN actions differ depending on: the location(s) of the needle placement(s), the depth of the insertion(s), the needle forces and motions used and whether or not a LTR is elicited.[43]

Studies are needed to identify optimal intervention parameters for DN. Most of the existing studies on needling analgesia have focused on physiological pain in "normal" animals and human volunteers. However, current evidence points to far more complex pain mechanism, especially in chronic pain patients. When chronic pain and central sensitization are present, there is an increased responsiveness to a variety of peripheral stimuli. A general recommendation in these patients is to not increase pain during treatment, as any therapeutic intervention could serve a new peripheral source of nociceptive barrage sustaining the process of central sensitization.

DN activates several types of receptors, including nociceptors and daily practice shows it is not always well tolerated in patients with central sensitization and therefore may not be a suitable choice. In a recent educational resource paper, published by the AmercianPhhysical Therapy Association (February 2013), it is highlighted that severe hyperalgesia or allodynia may interfere with the application of DN, However, it should not be considered as an absolute contraindication. Several authors suggest in their reviews that treatment of concurrent MTrPs in, E.g., fibromylgia should be systematically performed before any specific fibromyalgia therapy is undertaken.[44]Their idea is that any peripheral source of nociception should be removed before desensitization of the central nervous system can become the focus of the therapy.

CONCLUSION: We can conclude after reviewing the current basic science findings, that the physiological mechanisms and effects of DN are highly complex and recruit central and peripheral networks with physiologic and psychological responses. The addition of dry needling to the therapeutic process, when performed by trained practitioners, requires minimal low cost equipment and can be administered in relatively short period of time, thus, making it an economically efficient means of reducing pain in patients with neuromusculoskeletalconditions. To better explore the DN mechanisms of analgesia, adequate models of chronic pain should be developed and applied in research. There is still long road before the clinician has a well-constructed, evidence based explanation model of DN. We hope this review will stimulate researchers to further explore the mechanisms and physiological effects of DN by conducting experiments that are both methodologically sound and clinically relevant.

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