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MYOFASCIAL PAIN AND TREATMENT: Editorial

A critical overview of the current myofascial pain literature – February 2019

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ABSTRACT

This edition of the overview of current myofascial pain literature features several interesting and important publications. From Australia, Braithwaite and colleagues completed an outstanding systematic review of blinding procedures used in dry needling (DN) studies. Other papers tackled the interrater reliability of the identification of trigger points (TrP), the presence of muscle hardness related to latent TrPs, pelvic floor examination techniques, and the links between TrPs, headaches and shoulder pain. Israeli researchers developed a theoretical model challenging the contributions of the Cinderella Hypothesis to the development of TrPs.
As in almost all issues, we included many DN, injection and acupuncture studies, which continue to be the focus of researchers all over the world.

1. Basic research

Braithwaite FA, Walters JL, Li LSK, Moseley GL, Williams MT, McEvoy MP. 2018. Effectiveness and adequacy of blinding in the moderation of pain outcomes: systematic review and meta-analyses of dry needling trials. PeerJ, 6, e5318

Most DN trials are inadequately blinded as Braithwaite and colleagues summarized in this interesting study. Without effective blinding and adequate blinding procedures, the specific effects of DN are being called in question. This systematic review aimed to study the influence of blinding on intervention effect estimates in DN trials by asking “does blinding effectiveness moderate intervention effect on pain?” and “does blinding adequacy moderate intervention effect on pain?” The authors followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist and searched multiple databases, including MEDLINE, EMBASE, AMED, Scopus, CINAHL, PEDro, and the Cochrane Library, which were cross checked with various clinical trial registries, such as the Australian New Zealand Clinical Trials Registry (ANZCTR), Clinicaltrials.gov, and the World Health Organization International Clinical Trials Registry Platform (WHO ICTRP). This is a very high-quality systematic review and a welcome and needed addition to the DN literature specifically, but also to the broader field of scientific inquiry.

Only 24 studies out of a total of 4,894 met the inclusion criteria. Of those 24,5 trials were adequately blinded, while in the remaining 19 the risk of methodological bias was high or unclear. As found in other studies, the authors confirmed that exaggeration of intervention effects occurred in trials with inadequate allocation concealment and/or outcome assessor blinding, which implies that blinding is also very important with DN studies. The authors did not find evidence of a moderating effect of blinding index on pain. For short-term and long-term pain assessments, pooled effects for inadequately blinded trials were statistically significant in favor of active DN, and there was no evidence of a difference between active and sham groups for adequately blinded trials. The authors emphasized that the meta-analytical techniques were not randomized comparisons and as such, observational in nature. They also mentioned that not enough data is available to understand moderating effects of blinding effectiveness or adequacy on pain.

De Groef A, Van Kampen M, Dieltjens E, De Geyter S, Vos L, De Vrieze T, Geraerts I, Devoogdt N. 2018. Identification of myofascial trigger points in breast cancer survivors with upper limb pain: interrater reliability. Pain Medicine, 19(8):1650-1656

Myofascial pain is a common complaint following surgical intervention for breast cancer treatment with a 45% prevalence rate one year after surgery (Torres Lacomba et al., 2010). Although increased knowledge of this potential dysfunction has been identified, the reliability of identifying TrPs in this patient population has not been investigated. This study was conducted on 30 women with a history of prior mastectomy/breast-conserving and/or axillary lymph node dissection/sentinel node biopsy for breast cancer and having complaints of pain in the upper limb region (visual analog scale > 40/100) during the past week. Trigger point examination was performed to examine both active and latent TrPs in the upper trapezius, levator scapulae, supraspinatus, infraspinatus, teres major, teres minor, subscapularis, pectoralis major and minor, serratus

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1360-8592/

anterior, and scalene muscles. A weighted kappa (WK) coefficient was calculated for the interrater reliability. The authors reported moderate agreement (WK = 0.41–0.60) for all muscles examined, except for the upper trapezius muscle, which was almost perfect (WK = 0.83), and only fair agreement for the supraspinatus muscle (WK = 0.23).

The examiners in this study underwent two training sessions prior to the initiation of this study to have a better understanding of palpation techniques and examination protocol. The results of this study demonstrate moderate reliability in the identification of no, latent, or active TrPs in the upper limb muscles in breast cancer survivors presenting with upper limb pain. Diagnostic testing, such as vibration elastography, ultrasound, and electromyographic examination, has been utilized to identify TrPs, however in the clinical setting palpatory examination is more commonly performed. This study demonstrates that with proper training moderate reliability in the identification of TrP can be achieved.

Grabowski PJ, Slane LC, Thelen DG, Obermire T, Lee KS. 2018. Evidence of generalized muscle stiffness in the presence of latent trigger points within infraspinatus. Archives of Physical Medicine and Rehabilitation, 99(11):2257-2262

Researchers from the University of Wisconsin conducted a case-control study to evaluate the stiffness of the infraspinatus muscle tissue with and without latent TrPs. The authors hypothesized that an increased shear wave speed (SWS) would be identified within the latent TrP. Additionally, the SWS was expected to be higher in the region of the TrP in the patient group as compared to the control group but it would be similar between the two groups in the uninvolved regions. Nine subjects diagnosed with a single unilateral latent TrP in the infraspinatus and nine matched controls without a TrP present in both infraspinatus muscles were included in this study. Shear wave elastography (SWE) was utilized in this study with acoustic radiation to induce transient shear waves (Bercoff et al., 2004). The infraspinatus muscles were divided into 3 regions on each side to allow for testing parameters when comparing muscle tissues near the latent TrP.

The authors reported that the SWS of the latent TrP (mean = 4.09 m/s) did not differ from the adjacent muscle tissue (3.92 m/s), but it was elevated compared to corresponding tissue in the control group (2.8 m/s). The authors also noted the SWS was generally greater in the patients' uninvolved tissue (3.83 m/s) as compared to the controls corresponding tissue (2.62 m/s). While differences were not detected within the TrP, increased generalized muscle stiffness was noted within the patient group as compared to the control group. Although the clinical evaluation was performed by a physical therapist who is a board-certified specialist in orthopedics, the authors did not mention the years of clinical experience, formal training, or specialization in the examination and treatment of this patient population. Further testing with a bigger sample size and the inclusion of active TrPs is warranted to further investigate the use of SWE in evaluating TrP muscle stiffness.

Meister MR, Shivakumar N, Sutcliffe S, Spitznagle T, Lowder JL. 2018. Physical examination techniques for the assessment of pelvic floor myofascial pain: a systematic review. American Journal of Obstetrics and Gynecology, 219(5):497:e1-13

The authors, affiliated with the Washington University and Washington University School of Medicine in St. Louis, MO, USA, performed a systematic review of Ovid MEDLINE 1946-, Embase 1947-, Scopus 1960-, Cochrane Central Register of Controlled Trials, Database of Abstracts of Reviews of Effects, and the Cochrane Database of Systematic Reviews to summarize published examination strategies for the assessment of pelvic floor myofascial pain in women. After removing duplicates and screening for inclusion and exclusion criteria from a total of 5112 publications, 55 studies were eventually included in this study, which included randomized controlled trials, prospective cohort studies, retrospective cohort and case-control studies, cross-sectional studies, and general review articles or expert opinion papers. There were no systematic reviews. The authors commented that there was much variety among the papers and only two included a pelvic examination. The majority of papers failed to recognize counseling or mention informed consent prior to the pelvic examination and did not describe the preferred position of the patient. Furthermore, important details of the actual examination were missing in many papers. There was also a lot of variability between which muscles were included in the examination. Although pelvic floor myofascial pain is very common, there was no standardized physical examination protocol in the literature.

The authors succeeded not only in completing a detailed systematic analysis of the current literature, they also developed detailed guidelines for the physical examination of pelvic myofascial pain in women based on their review. Not only do we agree with the authors that a more structured examination is indicated, we recommend that similar studies be undertaken to establish guidelines for myofascial examinations for other regions in the body. Clearly, the guidelines have not been subjected to validation and reliability studies, which should be the next logical step. Only when clinicians follow a structured approach can examination approaches be standardized, which will not only improve the quality of the examination, but also the quality of care. We highly recommend that this paper be included in basic, advanced and post-graduate training programs for physicians, physical therapists, and other healthcare providers performing myofascial pelvic pain examinations.

Minerbi A, Vulfsons S. 2018. Challenging the Cinderella Hypothesis: A new model for the role of the motor unit recruitment pattern in the pathogenesis of myofascial pain syndrome in postural muscles. Rambam Maimonides Medical Journal, 30;9(3):e0021

While the pathophysiology of myofascial pain is not entirely clear, several lines of research point to an energy crisis in which the muscle energy consumption exceeds the energy supply. According to the authors of this theoretical model research, it is unknown what would cause normal muscles to experience an energy crisis. They maintain that the energy crisis hypothesis, originally expressed by Simons and Travell, (1981), does not adequately explain some basic questions. Interestingly, the authors did not mention that the energy crisis hypothesis was later incorporated into the integrated trigger point hypothesis (Gerwin et al., 2004), or even more recently into an expanded mechanical hypothesis (Jafri, 2014), perhaps because the energy crisis continues to be at the core of the different models. It is noteworthy that the authors mentioned that an impaired blood flow in the immediate vicinity of TrPs may cause a decreased energy replenishment (Ballyns et al., 2011), but they did not appear to accept that this may be a major cause or contributing factor to the hypothesized energy crisis.

Instead, the authors explored the Cinderella Hypothesis, which has been applied to the formation of TrPs based on the notions that 1. smaller motor units are being recruited first and de-recruited last, and 2. motor unit rotation would not occur. The Cinderella Hypothesis was first introduced in 1988 by Hägg (1988, 1991), although the authors attributed it to Kadefors and colleagues 11 years later (Kadefors et al., 1999). Minerbi and Vulfsons question the validity of the Cinderella Hypothesis and therefore, its role in the formation of TrPs. Research by Westgaard et al. showed different recruitment patterns in between tonic and phasic muscles (Westgaard and De Luca, 2001; Westgaard and de Luca, 1999). While in phasic muscles, characterized by fast-twitch fibers, motor units appear to be recruited in a hierarchical order as predicted by the Cinderella Hypothesis, motor units in tonic muscles (predominantly slow-twitch fibers) follow a rotational pattern, yet, TrPs are commonly observed in tonic or postural muscles. The authors hypothesized that motor unit relaxation time and a minimum relaxation/contraction time ratio may be more important in explaining the energy crisis hypothesis. Next, they created the so-called shift model to express that any motor unit, that does not get sufficient rest time, may experience an energy crisis.

It is beyond the purpose of this overview to describe the numerical modeling model the authors developed in detail. In summary, the authors concluded that loaded or weak muscles are more prone to an energy crisis. As the authors mentioned, the model does not assume that dysregulation of motor unit recruitment is required for an energy crisis to develop. Rather, under certain stressors, such as muscle weakness or overload, the physiologic recruitment pattern, demonstrated in human and animal postural muscles, may be sufficient to induce prolonged contraction and shortened relaxation times of individual motor units. As the Shift Model is a strict theoretical model, further in vivo studies are needed to test it.

2. Reviews

Bourgaize S, Newton G, Kumbhare D, Srbely J. 2018. A comparison of the clinical manifestation and pathophysiology of myofascial pain syndrome and fibromyalgia: implications for differential diagnosis and management. Journal of the Canadian Chiropractic Association, 62(1):26-41

Chronic musculoskeletal pain is a common condition, with two of its most common forms being fibromyalgia (FM) and myofascial pain syndrome (MPS). Inconsistent diagnosis of these conditions often occurs, with MPS being mistaken for FM. The authors prepared this review article to address the inconsistencies in the diagnosis of these conditions. MPS is characterized by regionally distributed muscular pain associated with TrPs, whereas FM is predicated on the presence of widespread pain greater than three months with the expression of symmetrically distributed tender points (TPs). Another clinical distinction between FM and MPS is the presence of other secondary conditions present with FM including sleep disorders, irritable bowel syndrome, fatigue, anxiety, depression, and Raynaud's phenomenon. Patients with MPS, however, have reported autonomic dysfunctions such as diaphoresis, lacrimation, flushing, dermatographia, and temperature changes (Borg-Stein and Iaccarino, 2014), which adds to the confusion discerning the differential diagnosis of FM and MPS.

Contrary to common belief, the gender distribution of FM and MPS is similar between men and women. A positive correlation in age and incidence in both MPS and FM is noted with the peak prevalence in FM in the 50–74 year age range, while MPS was reported in the 59–74 year age range (Gran, 2003; Bergman et al., 2001). The authors described that currently the diagnosis of FM is based on the 1990 and 2010 American College of Rheumatology diagnostic criteria (Wolfe et al 1990, 2010). The 1990 evaluation is based upon the implementation of both clinical history and physical examination including history of widespread pain for at least three months and palpable tender points in at least 11 of 18 standardized bilateral tender points (Wolfe et al., 1990). In 2010, alternative diagnostic criteria were added that included a Symptoms Severity (SS) scale and Widespread Pain Index (WPI) (Wolfe et al., 2010). The SS is aimed at addressing the pain and secondary symptoms, while the WPI records the pain pattern. The diagnosis of MPS is based upon Travell and Simons' criteria including regional pain complaint, referred pain pattern, palpable taut band, focal tenderness along nodule within a taut band, and restricted range of motion or muscle weakness (Simons et al., 1999). This article offers a comprehensive review in aiding the reader to gain insight in providing the clinical and diagnostic differences between these two conditions.

Of interest is that since 2010, several other criteria for the diagnosis of FM have been published (Wolfe et al., 2011; Marcus et al., 2013; Bennett et al., 2014). In 2016, Wolfe et al. published a revision of the 2010/2011 criteria, which was supposed to diminish the misclassification of regional pain disorders (Wolfe et al., 2016). In 2018, Arnold et published new criteria (Arnold et al., 2018), which were subsequently criticized by Wolfe, (2019).

Do TP, Heldarskard GF, Kolding LT, Hvedstrup J, Schytz HW. 2018. Myofascial trigger points in migraine and tension-type headache. Journal of Headache and Pain, 10;19(1):84

Trigger points have been implicated in chronic pain conditions including primary headache disorders. Do et al. from Denmark conducted a narrative review of the current imaging modalities used for the detection of TrPs and to review TrP studies of migraine and tension-type headache (TTH). The gold standard for the detection of TrPs, palpation, is unchanged since the 1950s. The authors feel that palpation is not very reproducible when TrPs are blindly examined in different patient groups. Unfortunately, the authors based their opinion solely on a 1992 study (Wolfe et al., 1992) and did not consider more recent interrater reliability studies, some of which have demonstrated good to excellent interrater reliability (Mayoral Del Moral et al., 2018; De Groef et al., 2018). The authors discussed several other technologies to assess TrPs, including ultrasound, microdialysis, electromyography, infrared thermography, and magnetic resonance imaging and concluded that ultrasound and EMG appear to be the most promising diagnostic modalities. Ultrasound is presumably the most viable candidate as a diagnostic test, as it can be used at nearly all treatment sites, is time-efficient, and non-invasive. Future studies should investigate if ultrasound is comparable to manual palpation in identifying TrPs.

Several studies have demonstrated a high occurrence of active and latent TrPs in migraine and TTH patients, but their role in the pathophysiology of each disorder, and the degree of their involvement is still unclear. Manual palpation can trigger migraine attacks. These findings may imply a causal bottom-up association, but studies of migraine patients with comorbid fibromyalgia syndrome suggest a top-down central sensitization mechanism. Active TrPs are prevalent in TTH, which is consistent with the hypothesis that peripheral mechanisms are involved in the pathophysiology of this headache disorder. Active TrPs in pericranial muscles in TTH patients are correlated with generalized lower pain pressure thresholds indicating they may contribute to central sensitization. The authors suggested that there is some support for the hypothesis that trigemino-cervical-complex pathophysiology is important in migraines and TTH.

Ribeiro DC, Belgrave A, Naden A, Fang H, Matthews P, Parshottam S. 2018. The prevalence of myofascial trigger points in neck and shoulder-related disorders: a systematic review of the literature. BMC Musculoskeletal Disorders, 25;19(1):252

Active and latent TrPs may contribute to neck and shoulder pain symptoms, cause muscle imbalances, weakness and impaired motor recruitment, altered muscle function, and expose joints to sub-optimal loading. Ribeiro et al. from New Zealand conducted a systemic review study of observational studies assessing the prevalence of TrPs in participants with neck or shoulder disorders. Seven studies were included. Each study focused on different populations and conditions, including chronic tension-type headache, chronic non-traumatic unilateral shoulder pain, nonspecific upper quadrant pain, acute whiplash disorder, unilateral shoulder impingement syndrome, cervical radiculopathy, and episodic migraine. The authors concluded that all studies had low methodologic quality due to small sample sizes, lack of control groups and blinding issues.

They could not perform a meta-analysis because of the many different patient populations, and also because different outcome measures were used in the included studies. The authors concluded that there was limited evidence supporting the high prevalence of active and latent TrPs in patients with neck or shoulder disorders. Point prevalence estimates of TrPs were based on a small number of studies with very low sample sizes, design limitations and a significant increased risk of bias. As Braithwaite et al. confirmed, inadequate blinding procedures may result in exaggerated intervention effects in DN trials (Braithwaite et al., 2018).

3. Dry needling, acupuncture, and injections

Affaitati G, Costantini R, Tana C, Lapenna D, Schiavone C, Cipollone F, Giamberardino MA. 2018. Effects of topical vs injection treatment of cervical myofascial trigger points on headache symptoms in migraine patients: a retrospective analysis. Journal of Headache and Pain, 8;19(1):104

Migraine headaches are a frequent and disabling condition with a high prevalence of TrPs with symptomatic referred pain patterns. The comorbidity between migraine and cervical TrPs has been shown to correlate with the frequency and intensity of migraines (Giamberardino et al., 2007). Cervical TrP anesthetic injections are commonly performed in the treatment of migraine symptoms, however, local pain is often reported. This study evaluated the use of a topical Non-Steroidal Anti-Inflammatory-Drug (NSAID) of the TrP to evaluate the effectiveness as compared to TrP injection.

A retrospective analysis of medical charts was conducted, of patients diagnosed with migraine without aura presenting with cervical TrPs and with referred pain areas coinciding with the site of migraine pain. Seventy-five patients were equally divided into 3 groups, with all patients receiving migraine prophylaxis (flunarizine 5mg/day) for 3 months and symptomatic treatment as needed. Furthermore, Group 1 received no TrP treatment, Group 2 received TrP injections of bupivacaine 5mg/ml at basis, 3rd, 10th, 30th, and 60th day, Group 3 received daily TrP topical treatment with 1.5 g of 3% nimesulide gel for 15 consecutive days, 15 days no intervention, followed by 15 consecutive days treatment.

Subjects were evaluated at 1, 2, and 6 months following initiation of treatment for the number of migraine attacks and rescue medications, migraine intensity, pain threshold to skin electrical stimulation (EPTs) and muscle pressure stimulation (PPTs). The authors reported that migraine symptoms improved significantly in each group. Subjects in Groups 2 and 3 symptoms had significant improvement at the 1-month follow-up versus Group 1 at the 2-month assessment. No improvement was noted in either threshold assessment in Group 1, while significant improvement was noted in both Groups 2 and 3 at the 1, 2, and 6-month follow-up. This study demonstrates the effectiveness of a multi-modal approach to migraine treatment incorporating treatment of cervical TrPs in the treatment of migraines when symptom provocation is noted upon assessment.

Bilici IS, Emes Y, Aybar B, Yalçın S. 2018. Evaluation of the effects of occlusal splint, trigger point injection and arthrocentesis in the treatment of internal derangement patients with myofascial pain disorders. Journal of Cranio-Maxillofacial Surgery, 46(6):916-922

The etiology of temporomandibular disorders (TMDs) may be related to the joint itself or to dysfunction of the masticatory muscles, including myofascial pain disorder. TMDs are characterized by pain, muscle spasms, and constraints in the movements of the temporomandibular joint. In this paper, Bilici and colleagues conducted a study of the treatment of patients with internal derangement and myofascial pain disorder. Patients treated with TrP injection therapy and stabilization splints were compared to patients treated with splints only. Injections were applied to all TPs identified within the masseter, lateral and medial pterygoid muscles at different time intervals. If, after using conservative treatments methods, the patient was still not pain free, arthrocentesis was performed. The authors concluded that the combined treatments were more effective than a single intervention immediately following therapy and after 3 months. Occlusal splint therapy is the most common conservative treatment, and other therapies such as TrP injections, and arthrocentesis help patients to get better more quickly.

Castro Sánchez AM, García López H, Fernández Sánchez M, Pérez Mármol JM, Aguilar-Ferrándiz ME, Luque Suárez A, Matarán Peñarrocha GA. 2018. Improvement in clinical outcomes after dry needling versus myofascial release on pain pressure thresholds, quality of life, fatigue, pain intensity, quality of sleep, anxiety, and depression in patients with fibromyalgia syndrome. Disability and Rehabilitation, 1464–5165; DOI: 10.1080/09638288.2018.1461259

Investigators from Spain performed a single-blind randomized clinical trial to compare the effectiveness of DN and myofascial release (MFR) on cervical muscle TrPs, quality of life (QOL), fatigue, anxiety, and depression in patients with fibromyalgia (FM). A total of 64 subjects with FM met the inclusion and exclusion criteria and were randomized into either the DN or MFR group. Outcome measures assessed included pressure pain threshold (PPT) testing to the bilateral occipitofrontalis, splenius capitis, sternocleidomastoid, anterior scalene, middle scalene, posterior scalenes, upper trapezius, middle trapezius, lower trapezius, supraspinatus, infraspinatus, and multifidi muscles, the SF-36 quality of life questionnaire, the Fibromyalgia Impact Questionnaire, the Pittsburgh Quality of Sleep Questionnaire Index, pain intensity with the Visual Analog Scale (VAS), the State-Trait Anxiety Inventory, the Beck Depression Inventory, the Fatigue Impact Scale, and the Hospital Anxiety Depression Scale. All outcomes measures were assessed before treatment and 2 days after the end of the four-week intervention period. For the DN group, 0.25×25 mm needles were inserted 5–15 mm into active or latent TrPs of each muscle. The criteria utilized to establish a TrP included a palpable band, a hyperirritable spot within the taut band, and referred pain. For the MFR protocol the authors described a protocol from a previous study. Results of the study showed that there was significant improvement in PPT's in most of the cervical muscles in the DN group versus the MFR group. There were significant differences between groups for 11 aspects of the SF-36 quality of life questionnaire. Similar findings were found for the Fibromyalgia Impact Questionnaire, sleep quality, State and Trait Anxiety Inventory, the Hospital Anxiety Depression Scale, and general pain intensity. As a result, the authors concluded that DN has greater improvements than MFR for improving PPTs, several components of the quality of life questionnaire, FM symptoms, sleep quality anxiety, fatigue, and pain intensity.

This is an interesting study comparing the effects of DN to MFR and their impacts on several different factors. Even through the results were significant and in favor of DN and with greater effect sizes than those receiving MFR, there are a few things related to the DN group that should be considered. First, the therapist's level of experience with DN and MFR was not described. Additionally, the authors used the “X's” marked on the muscles according to Simons et al., (1999). The X's were not intended to be used as the sole marker to identify TrPs within a muscle and this has more recently been addressed (Donnelly, 2019). Finally, the needles used were not very long, especially for some of the muscles that can be thicker and require a longer needle to access TrPs. The needles were inserted only 5–15 mm, which may not be adequate to get to the depth of some of the thicker muscles in this study.

Cerezo-Téllez E, Torres-Lacomba M, Mayoral-Del-Moral O, Pacheco-da-Costa S, Prieto-Merino D, Sánchez-Sánchez B. 2018. Health related quality of life improvement in chronic non-specific neck pain: secondary analysis from a single blinded, randomized clinical trial. Health and Quality Life Outcomes. 6;16(1):207

Chronic non-specific neck pain patients have more functional limitations that may cause disability, lower vitality and a worse general health status, leading to a negative impact on health-related quality of life (HRQoL). Multidisciplinary approaches, including exercise therapy, stretching, electrotherapy and manual therapy were suggested. The effectiveness of deep dry needling (DDN) for treating patients with myofascial pain syndrome related to chronic non-specific neck pain was reported in previous studies. Cerezo-Téllez et al. from Spain conducted a randomized parallel-group blinded controlled clinical trial. Chronic non-specific neck pain with active TrPs in various neck muscles were randomly allocated into an intervention group (DDN plus stretching) and a control group (stretching only). After 2 weeks with 2 sessions per week intervention, health-related quality of life was measured and analyzed with the Short Form-36 (SF-36) in 5 assessments (baseline, after intervention period, and at 1, 3 and 6 months after intervention).

The results showed that physical therapy with DDN plus stretching improved the HRQoL, especially in the areas of physical activities limitation (PF), physical problems (PR), social life (SF) and vitality or tiredness feelings (VT) in patients with chronic non-specific neck pain immediately and after 6 months. The present study did not include endurance and strengthening programs, which urged the authors to suggest that the improvement of HRQoL was primarily due to inactivation of TrPs.

Dunning J, Butts R, Henry N, Mourad F, Brannon A, Rodriguez H, Young I, Arias-Buria JL, Fernández-de-las-Peñas C. 2018. Electrical dry needling as an adjunct to exercise, manual therapy and ultrasound for plantar fasciitis: A multi-center randomized clinical trial. PLoS ONE 13(10):e0205405

Plantar fasciitis (PF) is characterized by intense sharp pain over the medial plantar heel with the first initial steps in the morning that increases with prolonged weight bearing activities. Treatment options for PF remain controversial and the recommended treatment methods remain inconsistent, including using silicone insoles, prefabricated or custom orthoses, manual therapy, strength training, or ultrasound therapy. Although some review articles have suggested that DN cannot be recommended for individuals with PF, DN may actually be a reasonable non-pharmacologic adjunct therapy for reduction of pain in patients who are already receiving other therapies (Cotchett et al., 2011).

Dunning and his colleagues conducted a randomized, single-blinded, multi-center, parallel-group trial to compare the effects of adding electrical DN on pain, function and related-disability in individuals with PF into a program of manual therapy, exercise and ultrasound. They concluded that the inclusion of electrical DN was more effective for improving pain, function and related-disability in individuals with PF at mid-term (3 months).

In this study, 111 patients were allocated to either a group receiving electrical DN, manual therapy, exercise and ultrasound, or a group receiving manual therapy, exercise and ultrasound only. Subjects in the DN group received six sessions of electrical DN following a standardized 8-point protocol. The primary target for DN was the plantar fascia at or near the medial tubercle of the calcaneus. “Periosteal stimulation” or “periosteal pecking” was performed over the most painful tender point at the medial calcaneal tubercle at or near the proximal attachment of the plantar fascia. The authors hypothesized that periosteal stimulation (i.e. pecking/peppering via multiple penetrations) may cause micro-trauma, trigger a local inflammation, augment the fibroblastic reparative process, increase the concentration, reorganize collagen fibers, and mediate the proliferative and remodeling phase of healing at the interface between the periosteum and plantar aponeurosis.

While the authors offer a plausible explanation, at this point more research is needed to gain further insights into the underlying mechanisms of the authors' interesting periosteal needling techniques. The risk of many DN studies is that it is tempting to assume a specific treatment effect based on a theoretical unproven mechanism. Of course, often this is the only way to move forward. Clinicians observe certain outcomes that may match an unproven theoretical construct. Research efforts should focus not just on the outcomes, but also study the potential mechanisms. In the DN literature, the search for mechanisms is usually conducted by a specific subgroup of researchers, who tend not to be clinicians (Jafri, 2014).

Eftekharsadat B, Porjafar E, Eslamian F, Shakouri SK, Babaei-Ghazani A. 2018. Combination of exercise and acupuncture versus acupuncture alone for treatment of myofascial pain syndrome: a randomized clinical trial. Journal of Acupuncture and Meridian Studies, 11(5):315-322

This Iranian study explored whether acupuncture combined with aerobic exercise would be more effective than acupuncture alone in the treatment of patients with myofascial neck or shoulder pain. Sixty-four subjects (55 female and 9 male) participated in the study and were randomly assigned to an acupuncture group or an acupuncture and exercise group. Outcome measures included a Visual Analog Scale, pressure pain threshold (PPT), the Neck Disability Index, and the QoL-SF36 scale for a Quality of Life assessment. Outcome measures were administered at baseline, at the end of the last treatment session, and at a 1-month follow-up visit. All subjects received 10 sessions of acupuncture or acupuncture combined with aerobic exercises three times per week. Pain, the Neck Disability Index, and the QoL-SF36 improved in both groups, but there were no statistically significant differences between the two groups. As the authors acknowledged, including an exercise-only group in the study design would possibly have provided more insights into the reasons for the lack of differences. Nevertheless, it is interesting that aerobic exercise did not add much additional benefit to acupuncture.

Escaloni J, Butts R, Dunning J. 2018. The use of dry needling as a diagnostic tool and clinical treatment for cervicogenic dizziness: a narrative review & case series. Journal of Bodywork and Movement Therapies, 22(4):947-955

The diagnosis and treatment of cervicogenic dizziness is often a challenge for clinicians. As the cervical spine can contribute to the onset and maintenance of dizziness, the upper cervical spine and especially the suboccipital muscles should always be evaluated. Suboccipital muscles play an important role in the positioning of the head in space and provide feedback to the vestibular system on the dynamic position of the head and neck. Escaloni et al. presented a case series of three patients, who were screened for signs and symptoms related to cervicogenic dizziness. Dry needling targeting the obliquus capitis inferior muscle was used diagnostically prior to treating the patients. Two patients reported full resolution of dizziness and significantly improved in their function, while the third patient noted significant improvement although she did not reach full resolution of her cervicogenic dizziness. The effect of the treatment was maintained for at least 6 months in all three patients. The diagnosis of cervicogenic dizziness is often considered a diagnosis of exclusion due to the absence of a gold standard and the lack of valid and reliable diagnostic tests. In cases of cervicogenic dizziness, the use of DN may initially be diagnostically relevant and able to compound the aberrant information being sent from the trigeminocervical nucleus to the vestibular nuclei. Identification of local problematic muscles that reproduce symptoms associated with cervicogenic dizziness during DN is useful in determining an appropriate intervention strategy.

Gaubeca-Gilarranz A, Fernández-de-Las-Peñas C, Medina-Torres JR, Seoane-Ruiz JM, Company-Palonés A, Cleland JA, Arias-Buría JL. 2018. Effectiveness of dry needling of rectus abdominis trigger points for the treatment of primary dysmenorrhoea: a randomised parallel-group trial. Acupuncture in Medicine, 36:302–310

Researchers from Spain and the US conducted a randomized, single blinded study on females with primary dysmenorrhea to examine the effectiveness of TrP DN on both pain and quality of life. Fifty-six females between the ages of 18 and 25 years of age with pain associated with primary dysmenorrhea (>30/100 on a visual analog scale - VAS) were randomly allocated to a TrP DN, placebo-needling or an untreated control group. A single session treatment was performed two weeks prior to each subject's menstrual period. Subjects in the TrP DN group received one session into active TrPs of the rectus abdominis muscle utilizing the fast-in and fast-out technique for 25–30s aimed at eliciting a local twitch response. Placebo DN was performed using a "Dong Bang" placebo needle, which allows the elicitation of mechanical stimulus over the tissue without perforating the skin. The control group did not receive any needling intervention. All groups were instructed were instructed in self-stretching exercises of the external and internal obliques and rectus abdominis muscles, to be performed 3–5 times daily.

Outcomes were assessed at baseline, 1 month, and 2 months after treatment on the same days of the menstrual cycle. Outcomes were assessed for VAS, health-related quality of life (SF-36 questionnaire), use of nonsteroidal anti-inflammatory drugs (NSAIDs), number of days with menstrual pain, and self-perceived improvement using a 4-point Global Rate of Change (GROC). Females in the TrP DN group reported a significant decrease in pain compared to those in both the placebo and control group at both 1- and 2-month follow-ups. Subjects in the TrP DN group also exhibited a significant decrease in the amount of NSAIDs taken. There were no differences between groups in the number of days with dysmenorrhea-associated pain or quality of life between subject groups. This study demonstrates the use of TrP DN in the treatment of dysmenorrhea. Future studies that include other surrounding muscles, multiple treatments, and longer follow-ups are warranted to further explore the effectiveness of this treatment approach in this patient population.

Hadi S, Khadijeh O, Hadian M, Niloofar AY, Olyaei G, Hossein B, Calvo S, & Herrero P. 2018. The effect of dry needling on spasticity, gait and muscle architecture in patients with chronic stroke: A case series study, Topics in Stroke Rehabilitation, 25:5, 326-332

From Iran and Spain comes a case series study on the effects of DN examining spasticity, gait, and muscle architecture on chronic stroke patients. Six patients with a six-month or greater history of unilateral stroke were included in this study. Each subject received a single session TrP DN to the medial and lateral gastrocnemius and soleus muscles. Ultrasonography measurements were performed at baseline (T0), immediately following intervention (T1), and 30 minutes after intervention (T2) accessing muscle thickness, pennation angle, and fascicle length. Outcome measures including the Modified Modified Ashworth Scale (MMAS) to assess spasticity of the ankle plantar flexors and the Timed Up and Go test (TUG) for gait evaluation were performed at T0 and T2.

The authors reported significant improvements 30 minutes after intervention for both the TUG and MMAS testing. In addition, a significant decrease in pennation angle and muscle thickness, and a significant increase in fascicle length of gastrocnemius medialis were observed following DN. Although these changes are promising, this study has several limitations including the small sample size with only a 30-min follow-up, the lack of a control group, and the lack of blinding of the examiners during the clinical evaluation. The authors did not report the level of training or experience of the clinician performing the ultrasonographic examination. Further studies that include a larger sample size, a control group, and longer term follow up are warranted to examine the effects of DN on spasticity in the treatment of chronic stroke patients.

Kim DY, Kim JM. 2018. Safety and efficacy of prabotulinumtoxinA (Nabota®) injection for cervical and shoulder girdle myofascial pain syndrome: a pilot study. Toxins (Basel), 10(9): 355

Investigators from Korea performed a pilot study looking at the efficacy and safety of PrabotulinumtoxinA in subjects who have cervical and shoulder girdle myofascial pain. Twelve patients received an injection into the muscle belly of the muscles identified with TrPs. Outcome measures assessed included the Neck Disability Index (NDI) and pain with the Numeric Pain Rating Scale (NPRS). Results showed that there was a statistically significant difference in the NDI at 6 and 12 weeks compared to baseline but not immediately post-injection. There were also statistically significant differences in pain scores at 12 weeks versus baseline, but not at 6 weeks. No adverse events were reported over the course of the study. Although the results suggest that PrabotulinumtoxinA injections are safe and seemingly effective, this should be interpreted with caution. As the authors stated, the sample size is small and a larger scale study needs to be performed. In addition to what the authors reported, there was no control group, so the improvements here cannot be assumed to be solely from the injections, they could be due to placebo. Furthermore, the muscles examined for TrPs were also not listed, nor was the criteria used to determine if a TrP was present or not. The experience of the person identifying TrPs was also not specified. With these other details missing it would be challenging to reproduce this study on a larger scale and also interpret the results.

Laskin D. 2018. The use of botulinum toxin for the treatment of myofascial pain in the masticatory muscles. Oral and Maxillofacial Surgery Clinics of North America, 30(3):287-289

The author of this brief article on the use of botulinum toxin injections in the treatment of individuals with masticatory myofascial pain rejects all proposed theoretical explanatory models to date. He denies that myofascial pain and dysfunction could be caused by muscle hyperactivity as “electromyographic studies on the muscles of mastication […] do not always show an increase in resting muscle activity.” He also rejects that myofascial pain is characterized by inflammation in muscles, which to the best of our knowledge is not commonly thought of as a possible etiology. Furthermore, he does not believe that masticatory myofascial pain features TrPs, which he supported by citing Quintner et al.'s narrative review on the topic (Quintner et al., 2015). Dommerholt and Gerwin rejected nearly all arguments expressed by Quintner et al. and pointed out that Quintner and colleagues misquoted nearly all references in support of their opinions (Dommerholt and Gerwin, 2015). As such, it is a bit surprising that Laskin based his opinion on the Quintner et al. paper, as narrative reviews do not carry much weight compared to systematic reviews (Green et al., 2006). In fact, narrative reviews are also referred to as *unsystematic narrative reviews* (Oxman et al., 1994).

Yet, the author seems to give credibility to a newly proposed idea that botulinum toxin injections would somehow suppress the release of glutamate and substance P, citing a systematic review (Moreau et al., 2017). The paper describes that there is insufficient evidence for the use of botulinum toxin injections, supported primarily by referencing other systematic reviews, including a critical analysis by Gerwin, (2012). Gerwin's paper, however, did not review the effectiveness of botulinum toxin injections. Instead, the aim of Gerwin's paper was to review whether studies were “appropriately designed, conducted, and interpreted to provide guidance in the management of myofascial pain” (Gerwin, 2012).

The author makes an interesting statement that botulinum toxin injections should not be used even if the mechanism of action would be understood as the injections would only address the symptoms and not the cause of the problem. This seem to reflect a significant bias of the author. How can he speculate that a particular future treatment would only address symptoms, if the mechanisms of that future intervention are not yet known? He briefly addressed potential side effects of botulinum toxin injections, which are rare and not a major problem in clinical practice. Furthermore, he mentions that the costs of injections frequently escalate, which is not necessarily supported by evidence. Overall, the main aim of this paper appears to be to express the author's confirmation bias without adding much new information.

Lopez-Martos R, Gonzalez-Perez LM, Ruiz-Canela-Mendez P, Urresti-Lopez FJ, Gutierrez-Perez JL, Infante-Cossio P. 2018. Randomized, double-blind study comparing percutaneous electrolysis and dry needling for the management of temporomandibular myofascial pain. Medicina Oral, Patología Oral y Cirugía Buccal,1;23(4):e454-e462

Percutaneous needle electrolysis (PNE) has been used successfully in the treatment of patients with various musculoskeletal pathologies, such as patellar tendinitis, tennis elbow, osteitis pubis, and acute whiplash syndrome. With PNE, a low intensity galvanic current is applied through a solid filament needle to accelerate tissue regeneration. PNE induces an electrochemical reaction in the area to which it is applied, leading to cell necrosis, and a subsequent local inflammatory process in the soft tissue, phagocytosis, and repair of the affected tissue. Lopez-Martos and colleagues form Spain conducted a randomized, double-blind, single-center clinical trial to investigate the effect of PNE on TrPs of the masticatory muscles. They performed the PNE technique in the lateral pterygoid muscle (LPM) and compared it to deep DN and a sham needling procedure (SNP). Besides, they assessed the level of improvement in the general condition of the temporomandibular joint (TMJ), the patient's tolerance to the treatments performed, and possible side effects. The authors found PNE and DN are effective treatments for myofascial pain involving the LPM to improve pain, mandibular mobility, and involvement of the TMJ. It appeared that this effect was achieved earlier with PNE than with DN. Perhaps the combination of TrP inactivation and the targeted regeneration of damaged muscle tissue accelerates the outcomes.

Machado E, Machado P, Wandscher VF, Marchionatti AME, Zanatta FB, O. B. Kaizer OB. 2018. A systematic review of different substance injection and dry needling for treatment of temporomandibular myofascial pain. International Journal of Oral Maxillofacial Surgery, 47:1420-1432

TrP needling may include DN and injections of various substances such as local anesthetics, botulinum toxin, and corticosteroids. Machado and colleagues from Brazil conducted a systematic review to evaluate the effectiveness of DN and injections with different substances on temporomandibular myofascial pain. Unfortunately, the findings were limited due to a lack of primary studies of acceptable scientific quality. The results of DN studies suggest that DN may be effective as measured by pressure pain thresholds and maximum mouth opening, but caution is needed because of the small sample sizes, short follow-up times, and methodological biases of DN studies. The authors suggested that to evaluate the effectiveness of botulinum toxin injections, better-conducted RCTs with larger samples and longer follow-up times are needed. The injection of other substances such as local anesthetics, corticosteroids, and other drugs was also evaluated in the present study, but methodological limitations and biases of the included studies compromised definitive results. Failures in randomization and allocation concealment can introduce serious biases and challenge the quality of the generated evidence. The narrative analysis of the results showed that most of the studies had methodological limitations and biases. DN and local anesthetic injections seem promising, but there is a need to conduct further randomized clinical trials with larger samples and longer follow-up times to evaluate the real effectiveness of the techniques and evaluated substances.

Martín-Pintado-Zugasti A, Mayoral del Moral O, Gerwin RD, Fernández-Carnero J. 2018. Post-needling soreness after myofascial trigger point dry needling. Journal of Bodywork & Movement Therapies, 22(4): 941-946

Post-needling soreness is a common adverse effect following DN. Although DN is commonly performed in the treatment of TrPs, reduced treatment adherence has been attributed to postneedling soreness (Pérez-Palomares et al., 2010). Postneedling soreness is thought to be result of neuromuscular injury, and hemorrhage and inflammatory reaction caused by the needle. The needle insertions, pain perceived during treatment (Martin-Pintado-Zugasti et al., 2018; Martin-Pintado-Zugasti et al., 2016) and psychosocial factors (Martin-Pintado-Zugasti et al., 2017) have been shown to correlate with postneedling soreness. Postneedling soreness is usually resolved within 72 hours and commonly within clinical practice patients receiving DN do not consider this soreness relevant. However, patients with high levels of postneedling soreness who do not perceive DN as an effective treatment option may elect to forego further needling treatments. The authors point out that an accurate localization of the TrP may minimize the number of needle insertions and post-treatment hemostasis could reduce postneedling soreness. This article offers a nice comprehensive review of the causes and effects of postneedling soreness as a result of TrP DN, and a review of this article is warranted for clinicians who perform this treatment. Due to the frequency and potential negative association of postneedling soreness to clinical treatments, the treatment process should include proper patient education.

Raeissadat SA, Rayegani SM, Sadeghi F, Rahimi-Dehgolan S. 2018. Comparison of ozone and lidocaine injection efficacy vs dry needling in myofascial pain syndrome patients. Journal of Pain Research, 29;11:1273-1279

Dry needling is a procedure during which a thin filament needle is inserted into an affected muscle to reduce TrP activity and pain. Local lidocaine injections (LI) can induce a similar analgesic pathway; DN and LI are widely used minimally invasive procedures for managing myofascial pain. Recently, there has been increasing evidence supporting the role of ozone injections (OI) in the management of certain musculoskeletal disorders like lumbosacral disc herniations, knee osteoarthritis, meniscal injuries, and shoulder disorders, among others (Raeissadat et al., 2018; Ozcan et al., 2018). Ozone can improve tissue oxygenation, inhibit inflammatory mediators by downregulation of tumor necrosis factor (TNF) and tumor necrosis factor receptor 2 (TNFR2), and induce a moderate analgesic effect through phosphodiesterase A2 blockage.

Raeissadat et al. from Iran conducted a single-blinded study to evaluate the efficacy of OI in myofascial pain patients compared with wet needling by LI and DN. They concluded that all three therapeutic methods significantly improved patients' pain, pressure thresholds, and disability at 4 weeks follow-up, except for cervical lateral flexion range, which did not show remarkable improvement. The authors concluded that LI and OI were more effective than DN in improving pain and disability. Although the OI group showed slightly higher improvements on the VAS, PPT, and NDI compared with LI, no parameters revealed a significant difference between two groups. Since neither chronic or acute toxicity has been reported for ozone intramuscular injections, future studies should assess this new method versus other well-documented treatments or even in combination therapy regimens.

4. Manual therapy

Kim SJ, Lee JH. 2018. Effects of sternocleidomastoid muscle and suboccipital muscle soft tissue release on muscle hardness and pressure pain of the sternocleidomastoid muscle and upper trapezius muscle in smartphone users with latent trigger points. Medicine (Baltimore). 97(36):e12133

This Korean study explored whether "soft tissue release intervention" of the sternocleidomastoid (SCM) muscle (SSTR) and suboccipital muscles (suboccipital release or SR) can reduce pain experienced in the upper trapezius (UT) and SCM muscles considering that the two muscles share the same innervation. Seventeen smartphone users with latent TrPs in the UT were recruited for this single blinded, cross-over design study. Muscle hardness and pressure pain threshold were assessed prior to the study and after the interventions. The authors used the Neutone to test muscle hardness, which has been shown to have an intra-examiner reliability ranging from 0.94 to 0.98 (Hida and Amano, 2016). SSTR and SR were administered in random order with a week in between sessions.

SSTR resulted in a significant decrease in muscle hardness and a significant increase in PPT of the UT and SCM muscles. SR caused similar changes in the UT. When SSTR and SR were compared, the SSTR was significantly more effective. The authors recommended to not only treat the UT muscle with soft tissue techniques, but also treat the SCM. While there are some limitations of the study, such as small sample size, healthy individuals without pain, only young subjects, the lack of an established correlation between muscle hardness, and pain in symptomatic patients, this is an interesting concept that deserves further exploration. Many years ago, Chan Gunn already recommended treating the UT muscle with intramuscular stimulation to reduce pain and dysfunction in the SCM muscle (Gunn, 1997).

5. Other clinical studies

Hosseini L, Shariat, A, GhaffarI MS, Honarpishe R, Cleland JA, 2018. The effect of exercise therapy, dry needling, and nonfunctional electrical stimulation on radicular pain: a case report. Journal of Exercise Rehabilitation, 14(5):864-869

Iranian and US investigators described a single patient case of a 43-year-old male with severe low back and radicular pain of one year who responded well to a multimodal treatment approach that included DN. The patient had numbness and pain in the left lower extremity that had worsened over the past two months. He had an unremarkable medical history. Sitting increased his pain, whereas standing made it feel better. Magnetic resonance imaging showed a protruded disc at L4-5 and electromyography (EMG) testing showed moderate bilateral irritation of the L5-S1 nerve root. The patient had seen several providers, with no success in any of the treatments offered prior to seeing the current investigators, which included bed rest, electro-acupuncture, physical therapy, and hydrotherapy. Examination of the patient revealed full but painful lumbar range of motion (LROM), a positive left straight leg raise (SLR), TrPs in the gluteus medius muscle on the left, difficulty walking on his heel, a pain level of 9/10 on the Numeric Pain Rating Scale (NPRS) and 90/100 on the Visual Analog Scale (VAS), and an Oswestry disability score of 60%. Treatment consisted of four exercises that were shown only with pictures. No specific instructions or parameters were discussed. Non-functional electrical stimulation was also performed, but similar to the exercises, only a photograph was shown with the set up, but no parameters were covered or rationale why it was performed. Dry needling was performed on the gluteus medius muscle with several needles inserted into the muscle (per the photograph), but again, needle size, needle depth, criteria utilized to determine the presence of TrPs, and experience of the clinician in diagnosing and treating myofascial pain and TrPs were not discussed. The patient had a total of 4 visits; the total time frame for these visits was not mentioned. At the end of the four visits the patient reported no radicular symptoms, only centralized pain to the lumbar spine, a pain level rated as 2/10 on the NPRS and 30/100 on the VAS, full LROM, negative SLR, no TrPs in the piriformis, and an Oswestry disability score of 20%.

Besides the issues already mentioned regarding this paper, there are other limitations of this case study that should also be mentioned before any type of interpretation of information can be made, if any. When discussing the findings of the EMG, it is not clear what the authors meant by "irritation" of the L5-S1 nerve root. It would be clearer to specify what type of findings were found (or not) with the EMG. Additionally, it is not clear whether the authors only assessed the gluteus medius muscle for TrPs or multiple muscles in the lumbo-pelvic-hip region. Considering the patient had pain down the leg, it would make sense to assess the gluteus minimus muscle for pain referral (Skorupska et al., 2015). After the final treatment the authors reported that the piriformis muscle did not have any TrPs, yet initially they found TrPs in the gluteus medius muscle. So, it is not clear what muscle was actually assessed and treated with DN at this point. Furthermore, case reports, despite providing a low level of evidence, have the advantage of offering readers the insight of clinical reasoning and rationale for treatment that may not typically be thought about with randomized controlled trials. This paper failed to do that. As stated above there was no explanation for the parameters of the exercises chosen, nor a rationale for why those where chosen over others. The same goes for the implementation of electrical stimulation and DN. The patient also failed other prior treatments; however, nothing was mentioned regarding his thoughts and beliefs regarding these treatments or the recent treatment he received.

Kalichman L, Levin I, Bachar I, Vered E. 2018. Short-term effects of kinesio taping on trigger points in upper trapezius and gastrocnemius muscles. Journal of Bodywork & Movement Therapies. 22(3):700-706

Kinesio taping is a therapeutic taping technique developed in 1979 by Dr. Kenzo Kase in Japan. A few years ago, Wu et al. suggested that kinesio taping could be used as a possible therapeutic modality for myofascial pain (Wu et al., 2015). The exact mechanisms of kinesio taping are unknown, but there is some preliminary evidence that it may improve blood circulation, lymph flow, tissue mobility, and healing rates. Theoretically, kinesio taping may be useful in treating people with musculoskeletal problems.

Kalichman and his colleagues from Israel conducted two simultaneous randomized, single-blinded, controlled trials of the immediate and short-term effect of a kinesio taping on TrPs in the upper trapezius and gastrocnemius muscles. They found that a kinesio taping application, described as a "star application, space correction method, tension on base," may prevent sensitization which often develops in nontreated areas as assessed by TrPs palpation and pressure pain threshold (PPT) measurements. Trends of changes in the PPT were similar in the upper trapezius and gastrocnemius muscle studies, making it less plausible that the results occurred by chance or by error. Once again, the risk exists that the positive effects of a treatment approach are attributed to a theoretically unproven mechanism. In this study, do we know whether the specific kinesio taping approach using a star application is critical in reaching these results? Are the results specific to TrPs, which appears to be the case, but with the still incomplete knowledge of the underlying mechanisms of TrPs, is there any evidence that the results can be attributed to the changes in tissues or sensitivities? The authors did not offer any further explanation or hypothesis for the possible mechanisms of kinesio taping and TrPs, which would be a great start for the next series of studies.

Park KD, Lee WY, Park MH, Ahn JK, Park Y. 2018. High- versus low-energy extracorporeal shock-wave therapy for myofascial pain syndrome of upper trapezius: A prospective randomized single blinded pilot study. Medicine (Baltimore), 97(28):e11432

Korean investigators performed a prospective, single blind, randomized clinical trial to compare high-energy to low-energy extracorporeal shock-wave therapy (ESWT) on patients who have TrPs in the upper trapezius muscle. The criteria used to diagnose TrPs in the upper trapezius muscle were according to Simons et al., (1999) and the examinations were performed by two physiatrists. A total of 30 subjects completed the study and were randomized into receiving either high-energy or low-energy ESWT. Both groups received 15000 pulses one time a week for two weeks. The ESWT was performed by two physiatrists with over three years of experience using ESWT.

Outcome measures assessed included the Numeric Pain Rating Scale (NPRS), the Neck Disability Index (NDI), all six directions of cervical range of motion (CROM) with an inclinometer, and pressure pain threshold (PPT) testing with an analog algometer. Results showed that the NPRS, NDI, and CROM (side bending right and left, rotation to pain-free side) and PPT improved in both the high- and low-energy ESWT groups. In the high-energy group subjects also had a significant improvement in neck flexion and extension. Although the results suggest ESWT can be beneficial for patients with myofascial pain of the upper trapezius muscle, the authors did recognize several limitations of the study including a small sample size, a high female dominance of subjects, a short treatment period, and not having a control group. Additionally, it would be beneficial to compare the treatment to other physical therapy treatments like exercise or manual therapy in addition to a control group. ESWT devices are expensive, so unless ESWT is superior to less expensive treatments like manual therapy or exercise, there may not necessarily a huge benefit for this type of treatment when considering the cost-analysis.

Sebastiani AM, Cotait de Lucas Corso PF, Bonotto D, Feltrin de Souza J, Barbosa Rebellato NL. 2018. Does orthognathic surgery improve myofacial pain in individuals with skeletal class III? One-year follow-up. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 126(4):322-330

Estimates of the prevalence of temporomandibular disorder (TMD) range from 12% to 90.5% in patients with skeletal class III malocclusion. In addition, these patients have a higher prevalence of myogenic TMD and chronic pain than patients without malocclusion. Previous studies on the effect of orthognathic surgery on TMD patients with a skeletal class III malocclusion did not include any large longitudinal studies. Sebastiani et al. conducted a study of 47 patients with a 1-year postoperative follow-up period. The authors found temporary improvements in the frequencies of myofascial pain and headache. They speculated that decreases in joint pain and joint sounds might have been related to the reduced mouth opening during that period. With regard to maximum mouth opening, the authors found a long-term decrease in mouth opening. Since the study did not include a control group, conclusions are somewhat limited as it is not clear whether the results were due to having had surgery or placebo. As Harris summarized, surgery always implies a significant degree of placebo (Harris, 2016).

Statement of interest

Drs. Dommerholt and Finnegan and Mr. Hooks are affiliated with Myopain Seminars, LLC, Bethesda, MD, USA, an organization that promotes the recognition and treatment of individuals with myofascial pain. Dr. Dommerholt receives royalties from published

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Jan Dommerholt*
Bethesda Physiocare, Bethesda, MD, USA

Myopain Seminars, Bethesda, MD, USA

Li-Wei Chou
China Medical University, Taichung, Taiwan
E-mail address: chouliwe@gmail.com.

Michelle Finnegan
Myopain Seminars, Bethesda, MD, USA

ProMove PT Pain Specialists, Bethesda, MD, USA
E-mail address: mbfpt77@gmail.com.

Todd Hooks
Myopain Seminars, Bethesda, MD, USA

New Orleans Pelicans, New Orleans, LA, USA
E-mail address: trhooks@hotmail.com.

* Corresponding author.Bethesda Physiocare, 4405 East West Highway, Suite 403, Bethesda, MD, 20814-4535, USA.
E-mail address: jan@bpcemail.com (J. Dommerholt).

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