Dry Needling for Patient with Myofascial Pain related to Temporomandibular Disorder: A Critically Appraised Topic

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Background:

During my clinical experience I saw a 63 years old female patient with complaint of orofacial myofascial pain associated with temporomandibular disorder (TMD). Signs and symptoms include myofascial pain, clicking/popping noise with jaw opening, and tenderness with palpation. At the time, the therapist I worked with is not certified in dry needling so we performed manual soft tissue mobilization and Rocabado 6x6 and had fair clinical outcome after 3 weeks of treatment. However, the therapist and I discussed the potential treatment of dry-needling that would be performed by a certified therapist. This raised my interest about the topic to learn more about dry needling. I would like to know if there is research that looks at the effectiveness and clinical outcome when using dry needling to treat patient with myofascial pain that is related to TMD.

P: Patient with myofascial pain related to TMD
I: Dry needling
C: Exercise alone
O: Pain (self-report, pain pressure threshold)

Table 1. Search criteria for literature pertaining to the clinical question being examined.

Databases	Search Terms	Limits used
Pubmed PEDro EBSCO	Dry needling, exercise, temporomandibular disorder, myofascial pain	English language, randomized controlled trial, publication date 2010-2021

Introduction:

According to National Institute of Dental and Craniofacial Research, the prevalence of temporomandibular joint and muscle disorder (TMD) is between 5% and 12%.[1] Another study from international epidemiologic indicates that orofacial pain occurs in approximately 10% of the adult population and at least twice as prevalent in women as men.[2] Isong et al. determined that the overall prevalence of TMD pain was 4.6% with 6.3% for women and 2.8% for men.[3] Interestingly, the prevalence rates of myofascial pain that associate with TMJ disorders are higher among younger population.[1,2] Myofascial TMD pain is the most frequent diagnosis (42%) in patients with orofacial pain, followed by disc displacement with reduction (32.1%) or arthralgia (30%).[3] TMD and myofascial pain also contributes to a high proportion of socioeconomic costs, which are usually associated with comorbidities, such as depression and other psychological factors.[4] The prognosis of myofascial TMD is controversial and require more longitudinal studies to conclude better trajectories and prognosis.[3] Despite the prevalence, there are limited evidence available on the most effective approach in managing myofascial pain associated with TMD. There are conflicts among many clinicians in managing TMD myofascial pain due to differences in clinical training and experience. As physical therapists, we want to use

the best evidence based practice to best serve our patients. The purpose of this critical appraisal is to review the experimental research pertaining to dry needling in managing myofascial pain associated with TMD.

Summary of Research

Table 2. Details of the methodology and results of each clinical trial included in this appraisal.

Study	Design	Sample	Intervention	Outcome measures	Main results
Fernandez Carnero et al.[5]	RCT	n=12	Group 1: Deep dry needling (experimental) Group 2: sham dry needling (placebo) at the most painful point on the masseter muscle	Numerical pain rating scale (NPRS), Pressure pain threshold (PPT) over the master muscle TrP and mandibular condyle and pain-free active jaw opening were assessed pre- and 5 minutes post intervention.	The experimental group showed greater improvements in PPT levels in the masseter muscle ($p<0.001$) and condyle ($p<0.001$) and pain-free active mouth opening ($p<0.001$)
PEDRO Score: 8/10, therapists were not blinded and intention-to-treat was not included Eligibility criteria: (1) a primary diagnosis of myofascial pain according to the Research diagnostic criteria for TMD, (2) pain involving the masseter muscle, (3) duration of symptoms of at least 6 months, (4) pain on palpation of the jar muscles, (5) limitation of mandibular movement, (6) a mean intensity of pain corresponding to a weekly average of at least a 3 on VAS.					
Diracoglu et al.[6]	RCT	n=52	Group 1: Dry needling (experimental) Group 2: sham dry needling (placebo)	Pain pressure threshold (PPT) was measured with pressure algometry, VAS for pain intensity, unassisted jaw opening without pain.	Mean algometric values were significantly higher in the study group when compared to the placebo group ($p<0.05$). No significant differences between the two groups in term of VAS and unassisted jaw-opening without pain.
PEDRO Score: 8/10 therapists were not blinded and no allocation concealment. Eligibility criteria: Age 18-57, symptoms of at least 6 weeks, two or more trigger points in temporomandibular muscles.					
Aksu et al.[7]	RCT	n=63	Group 1: exercise and	Visual analog scale (VAS), mouth opening AROM,	Improvement in the assessment and response variable in

			protection training Group 2: dry needling plus exercise plus protection training Group 3: trigger point injection plus exercise plus protection training	functional limitation level, palpation for tender points of facial and neck muscles using algometry method.	all groups, particularly for pain and functional limitation status ($p<0.001$). Similar in terms of the improvement degree ($p<0.001$). Although not statistically significant, the highest improvement in the facial pain was seen in group 3 on day 10 ($p=0.235$) with no significant difference on day 30.
PEDRO Score: 4/10 No concealed allocation, no baseline comparison, subjects, therapist, and accessors were not blinded, intention-to-treat analysis was not included Eligibility: Age 18-65, temporal, lateral pterygoid and/or masseter tenderness, existing trigger points, symptoms for at least 3 months.					

Pain

The studies discussed above utilized both subjective and objective measures to assess patient's pain level. The two most common self-report pain rating tools used in physical therapy are the numeric pain rating scale (NPRS) and the visual analogue scale (VAS). Both NPRS ($r=0.96$) and VAS ($r=0.94$) have good test-retest reliability according to Shirley Ryan ability lab. Pain pressure threshold (PPT) was measured by using a pressure algometry to objectively measure the pressure required to evoke patient's myofascial pain symptom. According to Park et al, the digital pressure algometer showed high reliability and is useful parameter for assessing a treatment's effect.[8] The designs of the first two studies I mentioned above are similar and they yield very similar results. Fernandez-Carnero et al. utilized a two-way repeated measures analysis of variance (ANOVA) with intervention as the between-subjects variable and time as the within-subjects variable was used to examine the effects of the intervention.[5] The ANOVA detected a significant interaction between intervention and time for PPT levels in the masseter muscle ($F=62.5$; $p<0.001$) and condyle ($F=50.4$; $p<0.001$); in which the ICC of PPT reading was 0.94 (95% CI 0.88 – 0.97) and 0.916 (95% CI 0.83-0.96) over the masseter muscle and mandibular condyle respectively.[5] The result showed that PPT levels increased by 79.1% ± 44% in the master muscle and 98.9% ± 53% in the condyle after deep dry needling, which was significant greater ($p<0.001$) than the change of -8% ± 14% produced by dry needling.[5] Diracoglu et al. utilized VAS and PPT algometric values to determine the effectiveness of dry needling compared to sham dry needling.[6] The difference mean ± SD for PPT in experimental group was -0.57 ± 0.57 ($p<0.001$), in placebo group was -0.06 ± 0.10 ($p=0.005$).[6] VAS scores decreased after treatment for both group with no significant difference.[6] The results from these two studies show important implications that dry needling is an effective treatment in managing

myofascial pain by increase pain pressure threshold as well as support the hypothesis that there may be a beneficial effect of trigger point dry needling on the signs and symptoms in patients with TMD.

In the third study discussed above, Aksu et al. looked at the comparison of the efficacy of dry needling and trigger point injections with exercise in temporomandibular myofascial pain treatment.[7] All three groups showed improvement in subjective and objective symptoms following treatments.[7] VAS scores decreased in all groups; however, there was no significant difference in the median VAS score variation of the groups. ($p=0.557$).[7] The group that received dry needling and exercise showed more significant improvement in pain rating on Day 10; however, no significant difference was found in long term result between three groups.[7] The results from this study showed dry needling may be beneficial in short term managing of myofascial pain but there was no statically significant difference between dry needling and exercise.

Discussion

The critical appraisal of these clinical trials regarding dry needling reveal that there are certain limitations and further research are necessary in order to establish more concrete evidence. In the first two studies, dry needling showed that it is an effective treatment to improve pain level in patients with TMD myofascial pain.[5,6] However, when we look at the comparison between exercise and dry needling plus exercise, there was not a significant difference in long term clinical outcome regarding pain level between the two groups.[7] In the first study, the therapists were not blinded and the intention-to-treat analysis was not included, which may alter the statistical analysis and create bias regarding the effectiveness of the interventions. In the second study, the therapists were not blinded and they did not use allocation concealment. This can again potentially create bias when researchers unconsciously influent which participants are assigned to the intervention or control group. Despite these limitations, these two studies have a PEDRO score of 8/10, which are considered high quality studies. These randomized controlled trials also provide the highest level of evidence which is important to provide a foundation for future research on this topic. The RCT study by Aksu et al. has a PEDRO score of 4/10, which is considered low. However, this study looks at the comparison between dry needling and exercise alone, which is the intention of this critical appraisal. Clearly, there is a need for more research on the topic regarding dry needling and TMD myofascial pain due to the fact that dry needling is a relatively new physical therapy treatment.

Nevertheless, dry needling has been proven to be an effective, safe, and inexpensive treatment that can be added to the plan of care in treating patients with TMD myofascial pain. Though, dry needling should not be considered a stand-alone treatment. The management of TMD myofascial pain should include patient education, protective measurements, exercises, and modalities. Clinicians should also consider the contraindications and precautions when utilizing dry needling. A thorough screening should be performed on each patient prior to performing dry needling to ensure they are good candidates for this treatment technique. The APTA code of ethics principle #3 "Physical therapists shall be accountable for making sound professional judgments."[9] The therapist shall make judgments within their scope of practice and level of expertise.[9] It is our responsibility to make sound decision and choose the best treatments for each individual patient as well as used evidence based practice to provide the best service for our patients.

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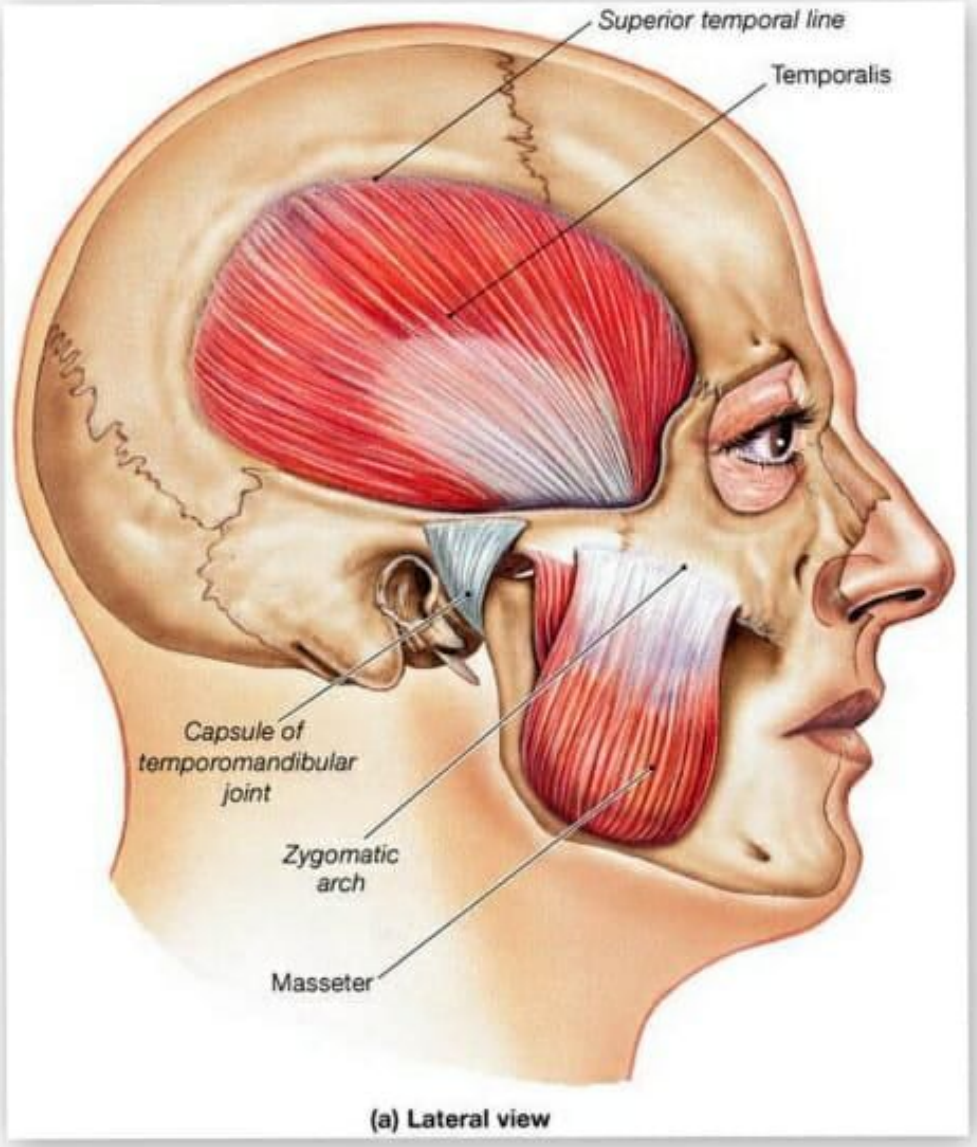
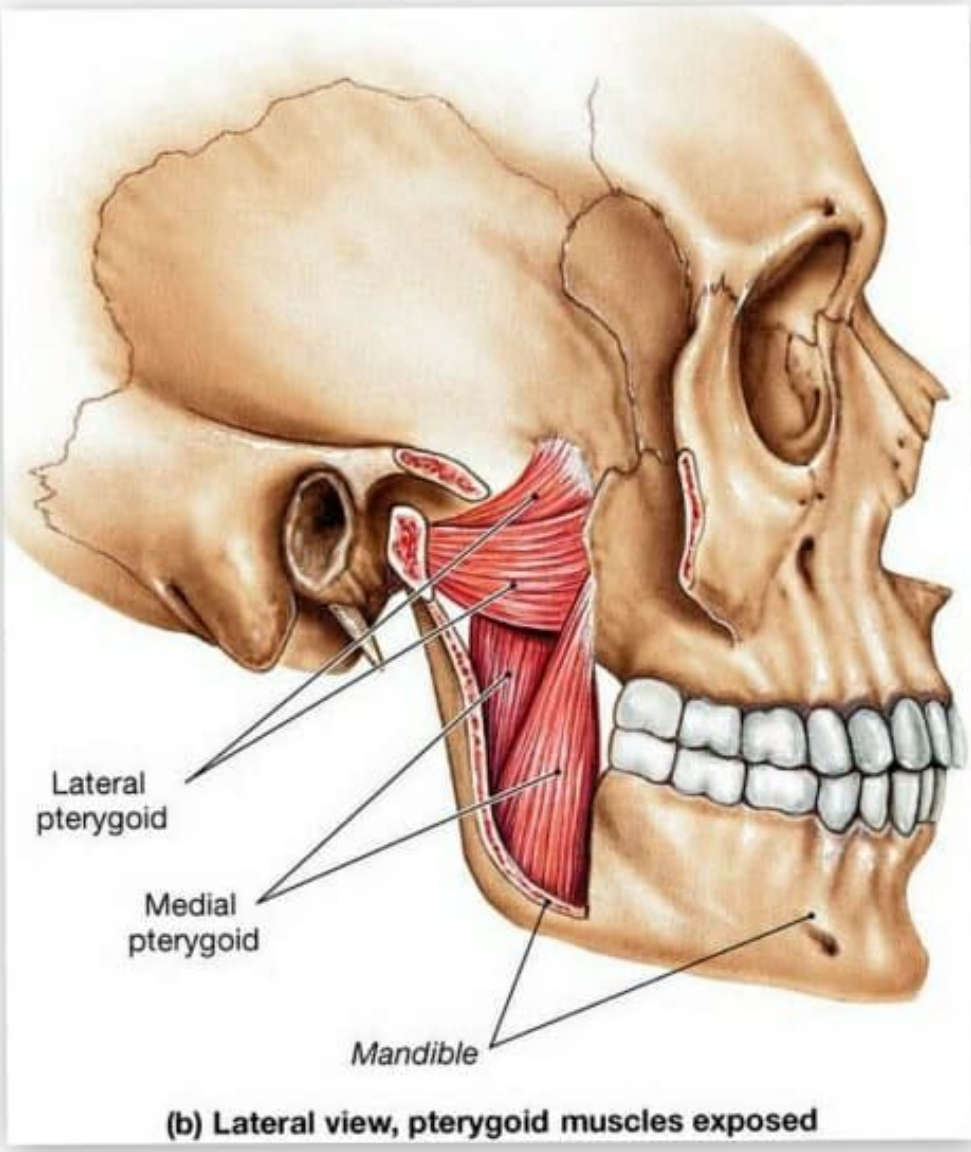


(a) Lateral view



(b) Lateral view, pterygoid muscles exposed